

WORKFORCE PLANNING IN THE KNOWLEDGE-BASED ECONOMY

Richard W. Judy, Director

Center for the 21st Century Workforce

Discovery Institute, Seattle Washington

A paper prepared for presentation at

Human Resource Development in a Knowledge-Based Economy

The 7th Annual Conference of the

Emirates Center for Strategic Studies and Research

February 11, 2002

Abstract

The history of successful economic development for the past two centuries is a chronicle of the harnessing of science and technology to achieve greater levels of productivity. In other words, it is the history of how economies have become increasingly knowledge-based. That historical process is now culminating in a “knowledge-based economy” in which intellectual property and human capital are the key determinants of competitive advantage.

The workforce implications of this phenomenon are profound. The incumbent workforces of few, if any, nations of the world are equipped with the knowledge and skills required by tomorrow’s jobs. Because of their greater investment in human capital, some nations are much better positioned than others. Such investment is what we mean by “workforce development.”

For individuals and nations to prosper in a “knowledge-based economy,” workforce planning and development must rise to new levels. By assessing the economy’s workforce needs and competencies, workforce planners must identify the gaps between what the workforce is and what it needs to become. Workforce development concerns three kinds of interventions: (i) Augmentation of workforce quantity; (ii) improvement of workforce quality; and (iii) improving the matching of job seekers with employment opportunities.

This paper develops guidelines for workforce development, explores how workforce needs and competences can be assessed and adduces examples to illustrate how some nations are achieving their workforce development goals and objectives. It concludes with a summary of emerging trends in workforce planning and development.

Table of Contents

Abstract.....	ii
Table of Contents.....	iii
Introduction	1
Workforce Planning for Knowledge-Based Economic Development: Some Historical Perspective.....	2
The Twenty-First Century Knowledge-Based Economy: How Is It Different and What Does It Mean for the Workforce?.....	5
Workforce Planning in the Twentieth Century.....	7
Soviet Manpower Planning: What Not to Do.....	7
Traditional Macro-Level Workforce Planning	9
Workforce Development: Guidelines for Developing an Effective Workforce.....	13
Assessing Workforce Needs, Competencies and Gaps.....	13
Improving Workforce Quality	18
Augmenting Workforce Quantity.....	19
Improving the Matching of Jobs With Workers.....	26
Achieving Goals and Objectives Through Workforce Planning and Development: Examples of Modern Practice.....	28
The Case of Singapore	28
Workforce Planning in the United States.....	31
Emerging Trends in Workforce Planning and Development	33
Bibliography	35
Endnotes	38

Introduction

The notion that a nation's economic development depends heavily on the knowledge and skills of its workforce has been with us for some considerable time. Over 200 years ago, Adam Smith, the progenitor of modern economics, saw the "productive powers of labor" as the key determinant of any nation's wealth. The very first paragraph of his *Wealth of Nations* makes clear that Smith's famous love affair with the "division of labor" derived from his perception that it led to worker specialization and thus greater "skill, dexterity, and judgment" in the workforce.

More recently, that is, sometime after the middle of the last century, the importance of human knowledge in producing individual and collective wealth began to attract serious attention among economists. That interest has continued to build ever since. Professor Gary S. Becker, who won a Nobel Prize in Economics for his ground-breaking work in this field, observed in the second edition to his book *Human Capital*, that a bibliography on the subject prepared in 1957 would have contained fewer than 50 entries, whereas one produced in 1964 would have contained 450. The bibliography of his book's second edition, published in 1970, contained more than 1300 entries.¹ A comprehensive bibliography of the subject, were it to be compiled today, would fill an entire volume by itself.

Workforce Planning for Knowledge-Based Economic Development:***Some******Historical Perspective***

The history of successful economic development for the last two hundred and fifty years has been the history of economies moving onto ever higher planes of technology. Technology is nothing more than the embodiment of knowledge in the machines, modes and methods of production. In other words, the history of economic development is the history of economies becoming more knowledge-based.

Modern economic historians place heavy emphasis on knowledge and skills as factors determining the success or failure of nations to achieve economic development. N. K. Chaudhuri, reviewing the reasons why Mughal India failed to develop economically to a level that would have prevented its subjection by the British, wrote:

In eighteenth-century India the empirical basis for an Industrial Revolution was conspicuously lacking. There had been no marked progress in scientific knowledge for many centuries, and the intellectual apparatus for a diffusion and systematic recording of the inherited skills was seriously defective.²

There can be no doubt that the British Empire owed its early size and spread to the superiority of British technology, which rested on what was then superior British knowledge and skills. Alarmed, other European powers sought to close the widening gaps between British power and their own. To do this, they pursued stratagems ranging from what today we would call “industrial espionage” to the direct recruitment of British talent. Later these gave way to more systematic—and more effective—efforts to build more “knowledge-based” economies (although that was not then the term of the day).

Some of these state-sponsored efforts to build “knowledge-based” economies succeeded brilliantly. The French, striving to catch the British, invested heavily in the education and training of “knowledge workers.” The famous Ecole Polytechnique, established in

1794, was staffed by the state with a top-notch faculty dedicated to inculcating the best and brightest of young Frenchmen in mathematics, science and technology.

The strongest...went into business, private and public, and formed the cream of French engineering and technocracy. They led in building and managing the French railways; learned and adapted the latest British metallurgical techniques; directed public works abroad; and by the twentieth century, came to head some of France's biggest high-tech corporations.³

The Germans were able to wrest technological superiority in chemicals from the British by investing heavily in the education of chemists and chemical engineers.

Britain did not have the trained and gifted chemists needed to generate invention. So when [German chemists who had been recruited to Britain] were drawn back home by attractive offers, the British organic chemical industry shriveled. In Germany, by contrast big corporations arose and flourished...built around top-flight chemists and chemical engineers, equipped with well-fitted house laboratories, and closely tied to the universities.⁴

In recognition of the vital link between knowledge, economic development and political/military power, the various German states invested heavily in education even before 1871 when those states were unified in the German Empire. This emphasis on education, especially technical education, intensified under the chancellorship of Otto von Bismarck.

In building their knowledge-based economy, the Germans went well beyond a few elite educational institutions. They also built a network of trade schools (*Gewerbeschulen*) to produce a rank and file technological workforce and an assortment of technical high schools (*technische Hochschulen*) that graduated some of the world's finest scientists and engineers. The Germans also invested heavily in scientific research and teaching at the university level. The combined result of this state-sponsored program to build a highly qualified workforce and the institutional R&D infrastructure created what was, by the beginning of the twentieth century, the world's premier "knowledge-based economy."

The reliance on formal education for the diffusion of technical and scientific knowledge had momentous consequences. First, it almost always entailed instruction in abstract and theoretical matters that

lent themselves to a variety of applications, old and new. Secondly, it opened the way to new branches of knowledge of great economic potential.⁵

The French and German efforts to build their knowledge economies were emulated farther east. The Austrians, Russians and eventually the Japanese pursued similar strategies with varying degrees of success. Because Japan was the first non-Western nation to pursue the strategy of building a knowledge-based economy, the Japanese experience warrants special attention.

Japan's Meiji Restoration in 1868 inaugurated an intense period of reform and modernization. Recognizing that a superior educational system was a prerequisite for economic development and nation building, the Meiji leaders created a national public education system. Initially modeled along German and, later, American lines, it was established explicitly to help Japan catch up with the West. From about 40 percent in the 1870s, the percent of school-age children actually enrolled in the new system rose to more than 90 percent by 1900. What followed was a modernization that combined major enduring elements of Japanese culture with Western technology, education and knowledge. The result was the creation of a powerful Japanese economy and state.

Despite the numerous educational changes that have occurred in Japan since 1868, and especially since 1945, the education system still reflects long-standing cultural and philosophical ideas: that learning and education are esteemed and to be pursued seriously, and that moral and character development are integral to education.⁶

The purpose of this backwards glance has been to emphasize the point that the history of successful economic development at the least since 1750 has been one of building ever more knowledge-intensive economies. To be sure, natural resources, geographical location and capital accumulation have played their roles—sometimes positive and sometimes negative—but modern economies have been built increasingly on technology and knowledge since the dawn of the Industrial Revolution. Effective workforce planning and develop-

ment—though it wasn't called that—throughout this period has taken the form of a sustained emphasis on education at all levels, research and unfettered scientific inquiry.

Generally speaking, those nations that followed the path of building knowledge-based economies have become prosperous and often powerful. Those that did not have not. Today, the disparities between the former and the latter groups of nations are broad and, sad to say, becoming broader with each passing year.

The Twenty-First Century Knowledge-Based Economy: How Is It Different and What Does It Mean for the Workforce?

As the pace of technological innovation accelerated in the late twentieth century, the gradual *evolution* of the world's leading economies in the direction of becoming more "knowledge-based" has become a genuine *revolution*. In a recent article in *The Economist*, the noted management guru Peter Drucker conjectured that, by 2030, 40 percent of the workforce will be knowledge workers. He was referring to the group of nations that have developed or are developing knowledge-based economies. The main traits of a twenty-first century knowledge-based economy are these:

- A high and rising share in GDP of output from knowledge-intensive industries, i.e., industries in which the quantity and quality of firms' intellectual property is critical to competitive success. These include the information technology (IT) industries and other high-tech sectors. They also include financial, business, health and educational services.
- The "knowledge content" of everyday goods and services is high and rising.⁷
- High levels of R&D at all levels, government, university and corporate.
- Rapid pace of technological innovation accompanied by insistent pressures on companies to innovate or lose competitive position.
- Shortening life spans for both products and services, i.e., a contraction of the time period between when they are designed or conceived to when they become obsolete and are replaced.
- Intense competition in markets where both buyers and sellers are very well informed by the Internet and other telecommunications media.
- A major need for rapid responsiveness and adaptability to ever-changing customer needs and other market circumstances. From this comes the need to know and anticipate those changes ahead of the competition.
- High tolerance of risk among businesses and individuals accompanied by a high incidence of entrepreneurial activity.
- High levels of "creative destruction" in which established technologies (and the companies based on them) are constantly threatened by newcomers both from within and outside their industries as previously defined.

- Many “gazelles,” i.e., recently formed and very rapidly growing companies based on new or transformed intellectual property.
- High levels of education and skills among broad sections of the population and workforce.
- More and more work is done by teams of people working collaboratively to combine their various talents to accomplish a common goal.
- Insistent pressure on individuals to upgrade their skills and knowledge bases in order to remain employable, well compensated and professionally mobile.
- High levels of penetration of computers, telecommunications, the Internet and other forms of information technology in homes, schools and workplaces.

By its very definition, “knowledge” is central to the “knowledge-based economy.” Competitive success for firms and individuals depends on the ability to produce new ideas, transform old ones, combine and codify that information into intellectual property and incorporate it into new products and processes. In short, success increasingly depends on individual and collective abilities to produce and use knowledge.

The shift from an agricultural or industrial economy to a knowledge-based economy carries profound implications for the workforce. The workforce’s level of knowledge and skills, its flexibility and responsiveness, the ability of its members to work in teams—all of these are raised to new and higher levels in the knowledge-based economy.

“This new knowledge economy will rely heavily on knowledge workers. At present, this term is widely used to describe people with considerable theoretical knowledge and learning: doctors, lawyers, teachers, accountants, chemical engineers. But the most striking growth will be in “knowledge technologists:” computer technicians, software designers, analysts in clinical labs, manufacturing technologists, paralegals. These people are as much manual workers as they are knowledge workers; in fact, they usually spend far more time working with their hands than with their brains. But their manual work is based on a substantial amount of theoretical knowledge which can be acquired only through formal education, not through an apprenticeship. They are not, as a rule, much better paid than traditional skilled workers, but they see themselves as “professionals”. Just as unskilled manual workers in manufacturing were the dominant social and political force in the 20th century, knowledge technologists are likely to become the dominant social—and perhaps also political—force over the next decades.”

Peter Drucker, “The Next Society,” *The Economist*, November 3-9, 2001

Workforce Planning in the Twentieth Century

Workforce planning in the nineteenth and early twentieth centuries was not called “workforce planning.” Workforce planners of those times were educators, educational administrators and educational policy makers who, like the man who was surprised to learn that he had been speaking prose all his life, would have been surprised to hear themselves called “workforce planners” or “workforce developers.”

“Workforce planning” or “Manpower planning” became modish during and between the two great wars of the twentieth century. In addition, centralized economic planning in the USSR and the use of some form of manpower allocation by most of the combatants in both World Wars raised hopes in some quarters that such techniques could promote peacetime economic development as well.

Workforce or manpower planning has been practiced at two very different levels: (i) The micro-level of the individual company or firm and (ii) the macro-level of national economies. The first type of workforce planning is essentially coterminous with human resource (HR) management, a discipline more properly in the domain of other participants at this Conference than in mine. The second type, that of macro- or national level workforce planning, is the focus here.

Soviet Manpower Planning: What Not to Do

Between the two World Wars, the idea that central planners could and should plan nations’ economies achieved broad currency, most notably in the Soviet Union. Small wonder, then, that the Soviets were among the first and certainly the most ambitious practitioners of manpower planning.

The Soviet economic system, as it existed from roughly 1928 to 1991, was centrally planned and directed—or, at least, it was intended to be that way. Acting according to priorities established by the Politburo of the Communist Party of the Soviet Union (CPSU),

the Soviet State Planning Commission (Gosplan) set goals for national economic development and elaborated both long- and short-range plans that were designed to achieve them.⁸ After World War II, Soviet-type central planning was transplanted to the East European nations that fell within the Soviet sphere. It was also adopted in modified form by the Chinese, North Koreans, Vietnamese, Cubans and other nations that sought to emulate the Soviet socialist example.

Gosplan endeavored to forecast the entire range of resources, including human resources, required to achieve their plans. Detailed manifests of specific occupations were developed which, in turn, were translated into targets for educational and training institutions. Young people were evaluated and streamed from an early age into specific manpower preparation programs that ran the gamut from unskilled workers to highly educated scientists and engineers. These targets became the basis for “production plans” of schools and higher educational institutions (*vyshevie uchebnie zavedenie* or “*vuzy*”).

Gosplan went as far as it could to supplant the market by applying command economy principles to the labor market. To state-owned and cooperative enterprises, Gosplan allocated “wage funds” and attempted to impose budgetary constraints on what they could pay their workers. Planners specified qualifications and compensation levels for thousands of occupations. While many *vuzy* graduates were formally obligated to accept employment in planner-designated locations for a limited number of years after graduation, this obligation was widely evaded by one means or another. Beyond this initial period of indenture, workers generally were allowed to make their own choices rather than being assigned to the workplace.⁹ That the system never worked as planned was not because Soviet politicians and planners didn’t wish it to.

The main deficiencies of Soviet workforce planning and the lessons to be learned were these:

- It was anti-market: The assumption that Gosplan or any other set of central planners could accurately determine future workforce needs proved to be ill-founded. Essentially, Soviet planners lacked the necessary information, prescience and computational ability to supplant the labor market with central planning and directives.
- Mismatches: Educating and training young people in highly specialized *vuzy* produced countless mismatches between workers' knowledge and skill sets, on the one hand, and the actual needs of industry on the other. As it turned out, many if not most workers found themselves working outside the narrow specialties for which they had been trained.
- Inflexibility: Narrow training left workers poorly equipped to adapt to new circumstances as they developed during their professional lifetimes.
- Conservativeness: Nobody in the Soviet system had much incentive to innovate. Planners, managers, educators and workers all found innovation to be disruptive of carefully calculated plans. Also, they found the risk associated with innovation to be threatening to their professional and personal security. Avoiding risk and innovation meant avoiding change and progress. Stagnation was the result.

One important positive lesson emerges from the Soviet experience and it should not be ignored. That lesson is that economic development and workforce development are overlapping domains. Attempting economic development with no eye to the workforce implications and needs is like trying to walk on a single leg. To attempt workforce development without a vision of economic development is to stumble aimlessly without a goal or destination.

Traditional Macro-Level Workforce Planning

Manpower planning of the traditional type—of which Soviet manpower planning is the classic example—starts with estimates or goals of output in some future year, often as many as ten or twenty years out. The increase in output is then multiplied by a vector of manpower coefficients to produce estimates of the additional labor requirements in each of

a number of labor categories or occupations. More sophisticated methods use matrixes of input-output coefficients to produce estimates of both direct and indirect demand for the various types of labor.

Because it operates with fixed coefficients, this methodology poorly reflects the possibilities of substituting capital for labor or of the substitution of one type of worker for another type. Nor can these fixed coefficients adequately reflect technical innovations that change the proportions with which various inputs are used in production.

When technological progress is rapid, as it is in modern knowledge-based economies, the coefficients employed in traditional manpower planning may be obsolete even before they come into use. Methods for estimating the coefficients rely mainly on historical data from the formal wage sector and undervalue what happens in the entrepreneurial or the informal sectors of the economy, which are both very important in developing countries.

Among the weak analytical links in the chain of traditional manpower planning is the presumption that the planners can accurately foresee the “final bill of goods,” i.e., the list of goods and services that the economy will produce or need to produce in some distant future year. Foreseeing the final bill of goods five or ten years in the future was next to impossible for Soviet central planners who were supposed to have control over such things. How much more difficult must it be, then, for manpower planners or forecasters who lack any control whatsoever over what a nation’s economy may be producing in some future year.

Although not an instance of manpower planning, the efforts of the U. S. Bureau of Labor Statistics (BLS), a division of the federal Department of Labor, to produce 10-year workforce and occupational projections is instructive.¹⁰ The BLS has produced occupational projections since the 1960s using a variant of the traditional manpower planning methodology described above. The purpose of these projections is to guide workforce pol-

icy makers, occupational counselors, educators, students, workers, scholars and the public at large. The projections provide the foundation for the statements on employment prospects presented in the biennially published Occupational Outlook Handbook.¹¹

Although the BLS has experimented with input-output analysis, its preferred analytical tool in recent years has been the industry-occupational matrix. Significant “improvements” have been made to BLS procedures over the years, but there has been no commensurate improvement in the accuracy of the projections.¹² When projecting the most aggregative occupational categories, e.g., executive and managerial occupations or professional specialty occupations, the BLS projections are reasonably accurate with errors in the range of 5-11 percent in recent years.

More detailed BLS projections, the sort needed for traditional workforce planning, have been subject to significant error. For the projection period 1984-95, for example, the BLS projected 500 different occupations with an average percentage error of 24. Twenty-eight percent of the projections were not even in the correct direction.

Even more troublesome has been systematic bias in the projections. That bias has been upward in the case of older occupations for which the BLS already has years of accumulated data—the occupations of yesteryear, as it were. For new and emerging occupations the bias has been in the opposite direction. When the projections for the latter have not been altogether absent (because the BLS has not yet spotted their existence or accumulated any data on them), they have been biased downward—often to an embarrassing extent. For example, in 1993, the BLS projected that the core information technology occupations would employ 1.5 million persons by 2005. In 1995, they raised their estimate to 1.6 million. In 1997, they raised it yet again—this time to 2.4 million. In fact, already by 2000, BLS’s own statistics were showing a total of 3.0 million computer specialists at work.¹³ When 2005 finally arrives and the data for that year are in, it would not be surprising to discover that IT employment was five times or more greater than the initial BLS projection.

The lesson to be drawn from the history of *traditional* manpower planning is simply that the information required to do it well cannot be produced. Long-term forecasting of manpower “requirements” is not feasible in a dynamic economy. Even workforce and occupational projections, done as in the BLS case for indicative purposes, are subject to serious error and troublesome bias. Small wonder, then, that traditional manpower planning has fallen from favor to be replaced by a more flexible and systems-oriented approach called workforce planning and development.

Workforce Development: Guidelines for Developing an Effective Workforce

It is convenient to think of workforce development in four overlapping categories:

1. Assess workforce needs and competencies.
2. Improve workforce quality
3. Augment workforce quantity.
4. Improve the way workers and jobs are matched together.

Assessing Workforce Needs, Competencies and Gaps

It is true, as the Cheshire Cat admonished Alice, that if you don't know where you want to go then any road will take you there. It is also true that if you don't know where you are and how you got there, it will be hard to find any road from where you are to anywhere else. The creation of a rational program of workforce development for any area begins with a study of workforce needs, competencies and gaps.

“Would you tell me, please, which way I ought to go from here?” asked Alice of the Cheshire Cat.

“That depends a good deal on where you want to get to,” replied the Cat.

“I don't much care where,” said Alice.

“Then it doesn't matter which way you go,” said the Cat.

Lewis Carroll, *Alice's Adventures in Wonderland*

Workforce Needs

Workforce needs are relevant only in reference to a specific economy, the workforce demand and supply conditions prevailing in it and reasonably specific notions of its probable or desired paths of economic development in the future. Our studies of workforce needs typically take the following form:

TAKE STOCK OF THE ECONOMY, WHERE IT IS AND WHERE IT MAY GO. What is the average per capita income? What is its distribution? How have those two indicators been changing in recent years? What are its industrial and occupational structures? How have they been

changing in recent years? What are the main economic clusters and how do they relate to the economy's competitive ability to export beyond its own borders?

IDENTIFY THE INTERNAL AND EXTERNAL FORCES THAT ARE DRIVING LOCAL ECONOMIC CHANGE. Depending on the location and circumstances, these are likely to include key technological trends, demographic trends, broad economic trends (e.g., globalization, development of local and distant markets), productivity trends, as well as political, geopolitical, social and cultural trends.

BUILD SCENARIOS OF FUTURE ECONOMIC DEVELOPMENT. Do not imagine that it will be possible to accurately forecast, much less plan, future economic development. Instead, try to "bracket" the set of possible futures by building "scenarios." Start by building a "surprise free" scenario of development over the next five or ten years.¹⁴ That baseline scenario is a picture of what might reasonably be expected to develop if the trends now prevailing continued to do so for the duration of the future period being contemplated. Then develop one or several scenarios of *feasible* futures that would be *preferable* to the surprise free scenario. Finally, develop one or several *not-altogether-unlikely* but more *dismal* scenarios, particularly scenarios of economic disappointment in which *workforce problems* (e.g., too few or the wrong kinds of workers, improperly skilled workers, poorly operating labor markets, etc.) appear as important factors contributing to that disappointment.

EXAMINE AND EXPLORE THE WORKFORCE IMPLICATIONS OF THE SCENARIOS. What quantities and assortments of occupations are implied by the various scenarios? What skill profiles accompany those various occupations? What will be required to raise productivity and enhance competitiveness? If the preferred scenarios envision a "knowledge-based economy," then what levels of competencies in the workforce will boost the probabilities of realizing those dreams? In the United States, various databanks link occupations and skills and provide useful references for workforce planners and developers. Some of these are mentioned later in this paper.

Workforce Competencies

An inventory of workforce assets is a necessary ingredient for coherent workforce planning and development. Without knowledge of the quantity and quality of those assets, workforce planning and development degenerates into guesswork. This inventory of workforce assets consists of providing answers to a set of questions such as these: What are the demographics of the area and how are they likely to change in the next few years? What are the labor force participation rates for various demographic groups in the population? How are these changing? How many workers do we have now? What is their demographic composition? What is the occupational structure of employment in the economy? What do we know about the skills and other workplace competencies of the incumbent workforce?

To assess these questions, some structured set of desiderata is required. The U.S. Secretary of Labor's Commission on Achieving Necessary Skills (SCANS) suggested the very useful set of basic skills and workplace competencies displayed in the two boxes at the end of this section.¹⁵ Ideally, measures of these skills and competencies would be available for a representative sample of the incumbent workforce. Unfortunately, this is rarely the case. In fact, American workforce planners and developers consider themselves lucky if WorkKeys® assessments results are available for all or most recent high school and/or community college graduates in these areas (see text box to the right).

**The Eight WorkKeys®
Assessments**

- Applied mathematics
- Applied technology
- Listening
- Locating information
- Observation
- Reading for Information
- Teamwork
- Writing

Source: <http://www.act.org/workkeys/>

Identify the Gaps

By spotlighting the disparity between what the workforce presently is and what it needs to be, a “gaps analysis” helps set the goals for workforce planning and development. In particular, a “gaps analysis” should spotlight how tomorrow’s workforce would need to differ quantitatively and qualitatively from today’s in order to raise the probability that the

real future will come closer to the preferred scenarios than to the dismal ones or even to the surprise-free scenario.

The “gaps analysis” should pose and answer questions such as these: Will workforce numbers be adequate to realize the area’s aspirations for economic development? Is there and/or will there be a “skills gap?” What disparities, if any, exist between (i) the skills and competencies of the incumbent workforce and graduates emerging from the area’s educational institutions and (ii) the skills and competencies required by the jobs most in demand? Those required by the occupations growing most rapidly in the area? Those whose compensation levels are high and/or rising most rapidly?

Box 1: SCANS Three-Part Foundation

I. Basic Skills:

- A. Reading--locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules
- B. Writing--communicates thoughts, ideas, information, and messages in writing; and creates documents such as letters, directions, manuals, reports, graphs, and flow charts
- C. Arithmetic/Mathematics--performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques
- D. Listening--receives, attends to, interprets, and responds to verbal messages and other cues
- E. Speaking--organizes ideas and communicates orally

II. Thinking Skills:

- A. Creative Thinking--generates new ideas
- B. Decision Making--specifies goals and constraints, generates alternatives, considers risks, and evaluates and chooses best alternative
- C. Problem Solving--recognizes problems and devises and implements plan of action
- D. Seeing Things in the Mind's Eye--organizes, and processes symbols, pictures, graphs, objects, and other information
- E. Knowing How to Learn--uses efficient learning techniques to acquire and apply new knowledge and skills
- F. Reasoning--discovers a rule or principle underlying the relationship between two or objects and applies it when solving a problem

III. Personal Qualities:

- A. Responsibility--exerts a high level of effort and perseveres towards goal attainment
- B. Self-Esteem--believes in own self-worth and maintains a positive view of self
- C. Sociability--demonstrates understanding, friendliness, adaptability, empathy, and
- D. Self-Management--assesses self accurately, sets personal goals, monitors progress, and exhibits self-control
- E. Integrity/Honesty--chooses ethical courses of action

Source: *What Work Requires of Schools: A SCANS Report for America 2000*. The Secretary's Commission on Achieving Necessary Skills, US Department of Labor, June 1991.

Box 2: SCANS' Five Workplace Competencies

I. Resources:

Identifies, organizes, plans and allocates resources.

- A. **Time**—Selects goal-relevant activities, ranks them, allocates time and prepares and follows schedules.
- B. **Money**—Uses or prepares budgets, makes forecasts, keeps records and makes adjustments to meet objectives.
- C. **Material and Facilities**—Acquires, stores, allocates and uses materials or space efficiently.
- D. **Human Resources**—Assesses skills and distributes work accordingly, evaluates performance and provides feedback.

II. Interpersonal:

Works with others.

- A. **Participates as Member of a Team**—Contributes to group effort.
- B. **Teaches Others New Skills**
- C. **Serves Clients/Customers**—Works to satisfy customers' expectations.
- D. **Exercises Leadership**—Communicates ideas to justify position, persuades and convinces others responsibly challenges existing procedures and policies.
- E. **Negotiates**—Works toward agreements involving exchange of resources, resolves divergent interests.
- F. **Works with Diversity**—Works well with men and women from diverse backgrounds.

III. Information:

Acquires and uses information.

- A. **Acquires and Evaluates Information**
- B. **Organizes and Maintains Information**
- C. **Interprets and Communicates Information**
- D. **Uses Computers to Process Information**

IV. Systems:

Understands complex inter-relationships.

- A. **Understands Systems**—Knows how social, organizational and technological systems work and operates effectively with them.
- B. **Monitors and Corrects Performance**—Distinguishes trends, predicts impacts on systems operations, diagnoses deviations in systems' performance and corrects malfunctions.
- C. **Improves or Designs Systems**—Suggests modifications to existing systems and develops new or alternative systems to improve performance.

V. Technology:

Works with a variety of technologies.

- A. **Selects Technology**—Chooses procedures, tools or equipment including computers and related technologies.
- B. **Applies Technology to Task**—Understands overall intent and proper procedures for setup and operation of equipment.
- C. **Maintains and Troubleshoots Equipment**—Prevents, identifies or solves problems with equipment, including computers and other technologies.

Source: *What Work Requires of Schools: A SCANS Report for America 2000*. The Secretary's Commission on Achieving Necessary Skills, US Department of Labor, June 1991.

Improving Workforce Quality

Very likely, the assessment of workforce needs and competencies will have identified important gaps in workforce preparation for economic development, especially if it is to be knowledge-based economic development. Information about those gaps will help focus educational and training needs.

From the knowledge-intensive nature of work in the twenty-first century knowledge-based economy, it follows that worker skills are different from the goods-based economy of yesteryear. From the rapid and accelerating pace of change, it follows that workers need to update, augment and even replace their old skills at a faster rate.

The workforce for a thriving knowledge-based economy will be built on a broad structure of skills, knowledge and understanding. The foundation of the structure consists of the basic skills of literacy and numeracy. For young people, the acquisition of these basic skills in elementary and secondary school is the bare minimum required for them to enjoy an acceptable standard of living. Nations that do not have a good system of primary and secondary education are consigned to the global backwaters of economic underdevelopment and poverty.

On paper, at least, many nations have achieved a minimal level of competence in these basic skills. Unfortunately, a knowledge-based economy demands more, and from the standpoint of these greater demands, many adults in most countries appear functionally illiterate and innumerate. For example, in Great Britain, which is by no means a global laggard, a recent study judged that as many as one person in five are functionally illiterate.¹⁶ Similar studies in the United States have produced depressingly similar results. The basic “skills gap” existing within a nation’s incumbent workforce sets limits on how far and how fast that nation can move to build a knowledge-based economy.

Basic education is, well, basic. Everybody needs it. But tertiary education is also vital to the knowledge-based economy. All the world’s great knowledge-based clusters,

with their associated agglomerations of talent, have at their core, and often as their progenitor, at least one major university. Such a university always has powerful research and graduate studies divisions in mathematics, science, engineering and often in management.

The most important guidelines for any nation, region or community that seeks to develop an effective workforce for a knowledge-based economy are these:

- Make primary and secondary education inclusive and mandatory for all youth and raise it to world class levels;
- Build at least one world-class university with exceptional teaching and research strengths in mathematics, science, engineering and management.
- Focus also on the incumbent workforce, its knowledge and skills. Determine which “skills gaps” exist and create the institutional infrastructure to make adult training and re-training as accessible as possible.

Augmenting Workforce Quantity

It would be a mistake to equate workforce development with education, training and other efforts to improve workforce quality. As we have argued, such improvement is vital even in the most economically advanced nations. Without a workforce pool that is adequate in quantity as well as quality, no economy is likely to prosper.

Recruit Workers From Elsewhere

There are but a few ways to augment workforce quantity in any nation or region. The most obvious of these is to recruit

“As the EU’s economies thrive and its populations age, they are turning increasingly to foreigners. In order to keep its working-age population stable between now and 2050, at current birth and death rates, Germany would need to import 487,000 migrants a year, according to a recent report by the United Nations’ Population Division. France would need 109,000, and the European Union as a whole 1.6m. To keep the ratio of workers to pensioners steady, the flow would need to swell to 3.6m a year in Germany, 1.8m a year in France and a staggering 13.5m a year in the EU as a whole.”

The Economist, May 6-12, 2000.

workers from elsewhere to relocate there.

Recruitment of foreign workers is nothing new. Historically, the economic development of North and South America as well as Oceania proceeded in direct proportion to the ability of these new nations to attract settlers. Nineteenth century workforce development in these areas amounted to not much more than recruiting European immigrants to settle empty lands and populate growing cities. Beginning in the 1960s, Germany recruited thousands of *gastarbeiter* (mainly Turkish men). This was certainly not the first time that Germany had tapped foreign workers to meet its workforce needs.¹⁷ Even more recently, nations like the United Arab Emirates and Singapore have also recruited workers assiduously from abroad to augment domestic workforces deemed inadequate to meet the demand for labor.

The juxtaposition of demographic projections with scenarios of desired or needed economic growth often reveals deep inconsistencies between the two in many parts of the world. Lagging population growth—or even demographic contraction—in many

“As the global war for talent heats up, this flow of the best and the brightest from developing countries is likely to increase. Singapore is recruiting in China, India, and Malaysia to fill IT positions. Japan forecasts that it will have to import at least 30,000 high-technology workers over the next five years. The United States has nearly doubled the annual quota of temporary work visas it grants to foreign professionals—to 195,000, from 115,000.”

Devan, Janamitra and Parth S. Tewari, “Brains Abroad,” *The McKinsey Quarterly*, 2001 Number 4

industrially developed nations and sub-national regions translates into workforces that are quantitatively stagnant or even declining. Such prospects clash with burgeoning elder populations and munificent senior entitlement programs. Japan, Italy and Germany along with other nations of Western Europe illustrate such cases.

Most nations, whether they already have such a thing or not, wish to spur the development of their knowledge-based economies. Clamors of a “shortage” of talent—typically of information technology (IT) and managerial specialists—can be heard in virtually every one of these countries.

For all these reasons, therefore, the international mobility of workers—particularly of well-educated and highly skilled workers—has become a major workforce development issue in many countries of the world. The recruitment and retention of top talent has become an obsession not only of international high-tech companies but also of nations themselves. We are now and will continue to be in the midst of a global “War for Talent,” according to a recent article bearing that title in the *McKinsey Quarterly*.¹⁸

Any nation, region or community that contemplates significant recruitment of foreign workers needs to pose and answer a list of very important questions. Among them are these:

- Will these be temporary workers or permanent settlers?
- What criteria will be used to select and admit immigrant/migrant workers? In particular, what will be the mixture of skilled and unskilled workers?
- What mechanisms will be employed to ensure that the immigrants do, in fact, match the intended criteria?
- What impact will the influx of foreign workers have on domestic labor markets? In particular, with which groups of domestic workers will the foreign arrivals compete in the job market? What will be the impact on the levels of compensation paid to domestic workers? What will be the political, social and economic ramifications of that impact?
- If the immigration is to be permanent, how will they be integrated into the domestic society? What institutions and facilities will promote their harmonious integration?
- How will the immigrants’ culture mesh with that of the domestic population? Does the nation (region, community) already have a history and

tradition of welcoming and assimilating foreigners? If not, then what can and should be done about it?

- If the immigrants are intended to be temporary residents, how will they be kept from becoming permanent if that is what they want to be? What problems may arise from efforts to repatriate them against their wishes?

In most countries, foreign immigration is a highly controversial issue and this short list of questions suffices to demonstrate why that is so. Immigration can sometimes be a partial solution to workforce problems but it often creates as many problems as it solves. Some of those problems may be unanticipated and of long duration. Recent American immigration experience illustrates the point.

Silicon Valley would not be the dynamic and innovative place that it is without the influx of tens of thousands of exceptionally talented and hard-working workers from Asia, Europe and elsewhere. At the other end of the skills spectrum, America's labor intensive industries, such as meat packing, would have been workforce challenged had it not been for the huge influx of Mexican and other Latino workers in recent years.

The skill-level distribution of American immigration is bi-modal; substantial numbers of highly skilled and well educated workers at one end, and huge numbers of modestly skilled and poorly educated workers at the other. The former are an almost unalloyed boon to the U.S. economy and, given the nation's immigrant-friendly traditions, will probably integrate well into American society. The latter, with their excellent work ethic, meet pressing workforce needs in the short run but present two major challenges. First, their influx tends to depress the salaries and wages of similarly skilled and educated domestic workers with whom they compete in the job market.¹⁹ A more serious challenge in the long run is the need to motivate and educate the children of unskilled immigrants to a level where they will be able to thrive in a high-tech, knowledge-based economy. Failure to do this will breed very serious social problems for the future.

After considering the issues raised above and as a matter of workforce development, a nation, region or community may decide to encourage foreign immigration and actively recruit foreign workers. If it does, it will need to think about ways to improve its attractiveness and to market itself as a place to live and work for the kind of immigrants it seeks. Some places are effectively doing this, as may be seen from the Singapore case study supplied later in this paper.

Retain Skilled Workers or Induce Them To Return

Brain drain is the loss of skilled and well-educated talent to foreign countries. It is the obverse of attracting foreign talent and it is a serious workforce problem for many nations and regions, especially in the developing parts of the world.

In 1995, some 1.4 million of the 12 million scientists and engineers working in the United States were born abroad. More than 72 percent of them were born in a developing country. Additionally, the higher the level of a person's diploma, the higher the probability that its holder was born abroad. Nearly a quarter (23 percent) of all persons holding doctorate degrees were born outside the United States, and this share rises to 40 percent among holders of doctorates in engineering and computer science.²⁰

This great influx of talent obviously represents a great boon to the American knowledge-based economy, buttressing as it does the US lead in science and technological capacity and innovation.²¹ The European Union also employs large numbers of foreign-born scientists and engineers. Japan does as well but to a much lesser degree.

The traditional view of this "brain drain" has been as a zero-sum game. The gain for the countries receiving the talent has been regarded as a net loss for the countries losing it. When the flow of talent is large relative to the losing country, one-way and permanent, this traditional view retains much validity. When this is the case, workforce development policy in the "donor" countries needs to address and, to the extent feasible, remove the causes of brain drain.

Why does talent leave? A recent Canadian survey shed light on why talented Canadians decamp to the United States.²² The main reasons (and the percent of respondents mentioning them) are these:

- Greater availability of jobs in migrants' particular field. (44 percent)
- Higher salaries. (39 percent)
- Greater availability of jobs in general. (35 percent)
- Better chance to gain or develop skills. (21 percent)
- Better career growth opportunities. (16 percent)
- Better employment benefits and perks. (11 percent)
- Lower taxes. (8 percent)

Every country suffering from a brain drain needs to conduct a study analogous to the one done in Canada in order to devise a defensive strategy. In addition, a brainpower-losing nation needs to understand not only the magnetic appeal of the U.S. (or other brainpower-attracting countries), but also its own features that may attract or repel the kinds of home-grown (and foreign-born) talent that it wants to recruit and retain.

The technical, professional and managerial talent driving a knowledge-based economy seeks, above all, opportunity for professional advancement. Almost by definition, these people tend to be very well informed and they also tend to be highly mobile. Via the Internet, they will know the job opportunities globally and be drawn to wherever those opportunities seem most attractive. The global locations that appear most attractive to knowledge-economy professionals are and will be those that already have a substantial concentration of the same kind of talent and the clusters of industries that employ it.

The result is a tendency toward geographical agglomeration of talent. Thus, we have Silicon Valley, which, through a series of historical circumstances (none of them having to do with explicit economic or workforce development policies) has become the premier global magnet for IT professionals. In New York and Paris, we find agglomerations of creative artists of all kinds. London, Boston, New York and Frankfurt are homes to huge concentrations of financial professionals.

The examples just cited are instances of *congealed agglomerations*, i.e., ones that have already taken on definite shape. The global leaders in these areas may be displaced in the future, but that is not likely to be done easily. Most of the efforts by countries, cities and other localities around the world to become the next “Silicon Whatever” represent the triumph of hope over probability.²³ Not all are destined for failure, however, since agglomeration often brings its own costs, e.g., congestion, expensive housing and general deterioration of lifestyles. But the odds of joining the charmed circle are likely to be long.

All of this points to the close connection between *economic* development and *workforce* development everywhere. A nation, region or community that is not already host to one or another concentration of knowledge-economy talent needs to ponder deeply how it can become one. It may make sense to focus on an industrial cluster in which no dominant agglomerations have already congealed. Bio-technology and nano-technology are two areas that show great promise for future commercialization and growth. Although some locales have a head start in these twenty-first century areas—all of them are centered around a university or other major research center—none has yet become dominant.

This digression on economic development returns now to the topic of brain drains and what to do about them.

As was mentioned above, the traditional view has been that a brain drain is a zero-sum game with one country (the destination country) winning all and the donor country losing all. That view has become obsolete in the twenty-first century knowledge-based economy. The emerging truth is that talent is multidirectionally mobile. As before, talented workers may flow from their home country to a destination country to study and/or work. In earlier years, such immigration was likely to have been permanent. Recently, however, we are seeing important return flows of talent back to home countries after periods of work and study abroad.²⁴

The lesson for both workforce and economic development is clear. One promising way to augment a nation’s knowledge-economy workforce is to entice those who have

gone abroad for work and/or study to return home—and to bring their skills, knowledge, connections and often their capital with them. “However,” admonishes a recent article in the *Financial Times*, “an important corollary is that the countries providing the flow of people in the first place must ensure that their industry and academic institutions provide good and attractive jobs that will entice back emigrants.”²⁵

Raise Workforce Participation Rates

A third important way to augment the quantity of labor is to increase the share of a nation’s (or a region’s or a community’s) population that is gainfully employed in the economy. That means raising labor force participation rates and lowering unemployment rates.

Many of the world’s nations exclude important segments of their populations from the workforce or impede their participation in it. Depending on where one looks, one often sees certain groups in society (e.g., ethnic minorities, handicapped persons and women) that are underrepresented in the workforce and/or who suffer discrimination in the workplace.

Discrimination of this kind always has its historical explanations and sometimes its cultural rationalizations. From a strictly workforce planning point of view, however, the exclusion of certain groups from the workforce or the discrimination against them represents a waste of human capital. It is no accident, for example, that the nations with the world’s highest per-capita incomes and highest rates of economic growth also have the world’s highest labor force participation rates for all persons whatever their ethnic, gender or handicapped status.

Improving the Matching of Jobs With Workers

Modern workforce development doesn’t stop with augmenting the quantity and improving the quality of the workforce. It extends also to the efficiency with which labor markets operate.

A critically important determinant of labor market efficiency is the flow of information about job opportunities and worker availabilities to workers and employers, respectively. If job seekers have difficulty in discovering which jobs are available and the terms of their employment, then the efficiency of their job searches can hardly be high. Similarly, labor markets cannot work well if employers with jobs to fill cannot locate suitable candidates even though they do, in fact, exist in the workforce. Labor market information, therefore, needs to be an important focus of workforce planning and development.

The traditional conduits of labor market information include informal methods such as word-of-mouth and personal referrals. They also include more systematic methods such as help-wanted advertisements placed in newspaper and magazines. These remain the main methods in use today in most places.

In the world's knowledge-based economies, the Internet is revolutionizing labor market information systems and the flow of job-matching communications between job-seekers and employers.²⁶ Many, perhaps most, larger corporations in the developed world have websites with pages devoted to employment opportunities with their companies. Many invite the submission of applications and resumes online. Job boards such as Monster.com and America's Job Bank advertise thousands of job openings and facilitate communications between employers and job seekers.²⁷ Other new Internet tools for labor market information systems include the employer survey information and workforce websites built by the ERISS Corporation.²⁸

In the United States, another important new institution devoted to improving the match between employers and job seekers is the One-Stop Career System. This system is described more fully towards the end of the next section of this paper.

Achieving Goals and Objectives Through Workforce Planning and Development: Examples of Modern Practice

The Case of Singapore

For most of the past half century, Singapore's national economic strategy was to develop an efficient production base for multinational corporations and local businesses, particularly in the manufacturing sector. That strategy resulted in a training and education infrastructure that was geared mainly towards producing an efficient workforce to support employers of those types. For many years, that strategy proved highly successful. Between 1960 and 1998, Singapore's real GDP grew by more than twenty-two times while real per capita GDP expanded by more than tenfold.²⁹

Recently, however, Singapore has experienced ever-increasing competition from much larger Asian nations (particular China and India) with their own rapidly growing manufacturing workforces. For those in Singapore with the eyes to read it, the handwriting was on the wall; The old economic strategy of selling the products of cheap labor on global markets would be not sustainable in the twenty-first century.

In May 1997, the Committee on Singapore's Competitiveness (CSC) set out to critically assess Singapore's economic competitiveness in the early twenty-first century, taking into consideration global trends and development of existing and emerging competition. The CSC was tasked to identify the problem areas and propose appropriate strategies and policies with a view to maintaining and strengthening Singapore's competitive position.

The CSC quickly recognized that the basic trends of economic liberalization, globalization and rapid technological change would be the key drivers of global economic change in the early twenty-first century.³⁰ Any coherent national plan for economic development needed to take full cognizance of these trends. From this recognition came the CSC's vision of Singapore's economic development strategy. It would be to:

...develop in the next ten years into an advanced and globally competitive knowledge economy, with manufacturing and services as the twin engines of growth. In a knowledge economy, the basis for competitiveness will be the capabilities and intellectual capital to absorb, process and apply knowledge.³¹

Long-term strategizing in 1998 had to contend with the immediate problems facing Singapore's workers at that time. The nation was then experiencing economic contraction in the wake of the 1997-98 "Asian Contagion." Economic growth was down, unemployment was up and Singapore found itself in its first recession since 1986. Unemployment needed to be tackled and work needed to be found for workers displaced by the economic contraction. But to realize the CSC's long-range vision, Singapore's leaders understood that they needed to look beyond the recession and carefully address the nation's long term workforce issues.

In April, 1999, Singapore's Ministry of Labor was transformed into the Ministry of Manpower and given the charge to address workforce issues from a national perspective and develop an integrated workforce strategy to support the CSC's long-range vision of economic development in the twenty-first century. The new Minister of Manpower explained that new strategy in the following words:

At the dawn of a new millennium, we are experiencing yet another shift [in our response to the changing global economic environment]. This time, we are leveraging on knowledge based enterprises. In this new and fast changing environment, it is intellectual capital which will determine the outcome of economic competition.³²

A new program, Manpower 21, was initiated to formulate an overall plan for the long-term development of Singapore's workforce as an essential component of the nation's economic development strategy. The explicit objective was and is to "...develop a globally competitive workforce to power Singapore into a knowledge based economy."³³

The plan includes a comprehensive blue-print covering worker training and upgrading to meet the demands for new skills in an environment of rapid technological change and a constantly evolving and extremely competitive global economy. It has the following main components:³⁴

- Improved workforce planning to produce a better match between the types of jobs that will be available and the skills that workers possess.
- Consolidation of workforce planning in a ministerial-level National Manpower Council, chaired by the Minister for Manpower, with the charge to establish directions for and oversee workforce planning, development and talent attraction.
- Development of an enhanced Manpower Information System to provide relevant and timely manpower information to policy makers, employers, training providers and individuals. Without complete, accurate and timely information, workforce planning is impossible.³⁵
- Implementation of the idea of a “School of Lifelong Learning” as a partnership among industry, employers, workers and government to promote education and training for incumbent workers. The goal is to support the continuous learning and training of adult workers and enhance their lifelong employability.
- Opening Singapore’s higher educational institutions in ways designed to offer better opportunities for adult workers to upgrade their skills and knowledge. This is to be done in consultation with employers to ensure that the training that workers receive corresponds with industry needs and leads on to better jobs and higher compensation.
- Implementation of the Skills Redevelopment Program (SRP), whose aim is to enhance the employability of older and less-educated Singaporean workers by equipping them with certifiable skills to meet the demands of the twenty-first century. The program provides financial incentives to both employers and workers to encourage lifelong learning. Such incentives include income tax relief and direct subsidies.³⁶
- Establishment of a “National Skills Recognition System” (NSRS) to develop skills standards and award recognition to persons acquiring training that meets the standards. Modular or “bite-sized” learning, part-time learning and on-the-job training (OTJ) is emphasized to enhance accessibility to employed workers.

- Creation of a network of One-Stop Career Centers to provide a single source of information to workers on labor market trends, skills demands, employment and training.
- Implementation of an aggressive program to recruit foreign talent to Singapore. This takes the form of “Contact Singapore,” which is a promotional and information source on life, learning, work and play in Singapore. In addition to its very attractive website, Contact Singapore now operates “bricks and mortar” centers in major cities located in Australia, Canada, Hong Kong, India, China, United Kingdom, United States and, of course, Singapore itself.³⁷
- Review of the nation’s foreign worker policy guidelines. Singapore, like the United Arab Emirates, is a large employer of expatriate workers. Under Manpower 21, the Ministry of Manpower is reviewing the nation’s foreign worker policy guidelines to re-allocate foreign workers from low to high value-added sectors. The aim of such re-allocation is to raise the skills of this important portion of Singapore’s workforce and, by doing so, to raise their productivity and compensation, and ultimately to minimize strains on the fabric of the island’s society.

Workforce Planning in the United States

In August 1998, the US Congress passed the Workforce Investment Act (WIA). In general, WIA sought to streamline and consolidate the bewildering array of US government programs aimed at unemployment assistance and workforce improvement that had been passed over the course of many decades. In addition, WIA sought to rationalize the institutional structure of workforce agencies throughout the nation. To do this, the Act mandated the creation of state and local “workforce investment boards” (WIBs) throughout the nation. The main functions of the WIBs, whether at the state or local level, are to provide strategic guidance to workforce development efforts in their areas of jurisdiction, to oversee the investment of funds designated for training and job assistance, and to supervise a network of “one-stop” career centers in virtually every city, hamlet and village.³⁸

Every workforce board is required by WIA to prepare a five-year plan of workforce investment and development for its area. The US Department of Labor provided guidelines to the states and localities according to which their plans were to conform.³⁹ The actual plans, most of which were completed in mid-2001 with many subsequent updates, vary greatly in quality. Some merely comply with the letter of the DOL guidelines and are devoid of any other useful content. Others were prepared on the basis of serious analyses of the economy, the workforce and the gaps as laid out here. For persons interested, all or most of the state workforce plans are available online.⁴⁰

The aim of the U.S. One-Stop Career System is to connect employment, education and training services into a coherent network of resources at the local, state and national level. The goal is to create a set of conveniently accessible offices throughout the nation into which any person can go for job and career assistance. Available services include computerized assessments of a person's skills, expert job counseling and coaching, financial assistance for training and retraining, and matching to jobs listed by local employers and accessed via America's Job Bank.⁴¹

Emerging Trends in Workforce Planning and Development

The difficulties encountered and the negative lessons learned in traditional manpower planning have provoked a fundamental rethinking of the field and a reconsideration of what it can hope to be. The lessons learned and the ideas underlying the trends now emerging in workforce planning and development are these:

- Do what is possible to improve the way labor markets operate by improving the quantity and quality of information available to all market participants and by removing artificial barriers that impede their response to signals emanating from the market.
- Work with the labor market, not against it. Understand the underlying forces driving change on both the supply and demand sides of labor markets.
- Be modest. Do not exaggerate the power of either manpower planners or economic planners to alter the tectonic forces that drive both demand and supply.
- Remember that workers are people and, unlike material resources, people behave independently in ways that often confound planners' intentions.
- Build flexibility into the system. The future is very likely to be quite different than anybody expects. Don't be stuck with "fixed coefficients" in minds, models and institutions.
- In particular, build an educational and training system that facilitates workers' adaptability to changing conditions and responds with alacrity to changing employer needs for knowledge and skills in the workforce.
- To the greatest extent possible, structure incentives to promote optimal response to changing circumstances.
- Keep an open mind. As competitive circumstances change, it will become necessary for workforce development systems to change as well.

Modern workforce planning shifts the emphasis from forecasting and meeting “manpower requirements” to a focus on the competencies and skills of the workforce and their degree of consistency with the employment opportunities emerging in the economy. Even more, it focuses on the qualities, capacities and flexibilities of labor market institutions as well as on the educational and training institutions in the public and private sectors.

Perhaps it is not surprising that the key ingredient in modern workforce planning and development in the knowledge-based economy is information itself—information, that is, about the workforce, the job opportunities of the economy and the institutional capacities to create the workforce needed.

Bibliography

- Becker, Gary S. *Human Capital: A Theoretical and Empirical Analysis, With Special Reference to Education*, 2nd edition. (New York, NY: National Bureau of Economic Research, 1975).
- . *Human Capital and the Economy*. Syllabus for a course at the University of Chicago. Available online at <http://www.src.uchicago.edu/users/gsb1/Econ357/syllabus.pdf>; INTERNET.
- Blunkett, David, UK Secretary of State for Education and Employment. "The Learning Age: A Renaissance for a New Britain." A "green paper" (UK Department for Education and Employment, 1998). Available online at <http://www.lifelonglearning.co.uk/greenpaper/>; INTERNET.
- Borjas, George J. *Heaven's Door: Immigration Policy and the American Economy*. (Princeton, NJ: Princeton University Press, 2001).
- Canada's Brain Drain [website] (Stornoway Communications, 2000). Accessible online at <http://www.canadasbraindrains.ca/home1.html>; INTERNET.
- Carroll, Lewis. *Alice's Adventures in Wonderland*. (City, ST: Publishing Co., year).
- Chambers, Elizabeth G., et al. "The War for Talent." *The McKinsey Quarterly* no. 3 (1998).
- Chaudhuri, K. N. *The Trading World of Asia and the English East India Company 1660-1760*. (Cambridge, UK: Cambridge University Press, 1978).
- Dawson, Keith. *Siliconia* [website] (Keith Dawson, 2002). Available online at <http://www.tbtf.com/siliconia.html>; INTERNET.
- Devan, Janamitra and Parth S. Tewari. "Brains Abroad." *The McKinsey Quarterly* no. 4 (2001).
- Dolan, Ronald E. and Robert L. Worden (eds). Chap. 3 in *Japan, a Country Study*. (Washington, DC: Library of Congress Federal Research Division, 1994). Available online at [http://lcweb2.loc.gov/cgi-bin/query/r?frd/cstdy:@field\(DOCID+jp0098\)](http://lcweb2.loc.gov/cgi-bin/query/r?frd/cstdy:@field(DOCID+jp0098)); INTERNET.
- Drucker, Peter. "The Next Society." *The Economist*, November 1, 2001.
- Employer Supported Training*. A report on the progress of the Skills Redevelopment Program (Singapore: Ministry of Manpower, September 2001). Available on-line at http://www.gov.sg/mom/manpower/manrs/docs/op_16.pdf; INTERNET
- ERISSWorks* [website] (ERISS Corporation, 2002). Available online at <http://www.usworks.com>; INTERNET.
- Hecker, Daniel. "Occupational Employment Projections to 2010." *Monthly Labor Review* vol. 124 no. 11 (November 2001).
- Herbert, Ulrich. *Hitler's Foreign Workers: Enforced Foreign Labor in Germany Under the Third Reich*. Translated by William Templar (Cambridge, UK: Cambridge University Press: 1997).
- Judy, Richard W. and Carol D'Amico. *Workforce 2020: Work and Workers in the 21st Century* (Indianapolis, IN: Hudson Institute, 1997).
- Landes, David S. *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor* (New York, NY: W.W. Norton & Co., 1998).

- “Launch of Manpower 21 Plan.” (Contact Singapore, 1999). Available online at <http://www.contactsingapore.org.sg/news/manpower21.htm>; INTERNET.
- Lee Yock Suan, Singapore Minister for Trade and Industry. Speech before Parliament on November 23, 1998. Available online at <http://www.gov.sg/mti/competitiveness/>; INTERNET.
- Lee Boon Yang. Speech given on launching Manpower 21, August 31, 1999. Available online at <http://www.gov.sg/mom/speech/speech99/m990831.htm>; INTERNET.
- Lommel, Jane J. *Network: Maximum Access to Career Resources on the Internet* (Bloomington, IN: 1st Books, 2000).
- Manpower Research and Statistics* [website] (Singapore Ministry of Manpower, 2000). Available online at <http://www.gov.sg/mom/manpower/manrs/manrs5.htm#lm98>; INTERNET.
- Marsh, Peter. “Idea of the Brain Drain ‘Is Outdated’.” *Financial Times*, December 20, 2001.
- Meyer, Jean-Baptiste and Mercy Brown. “Scientific Diasporas: A New Approach to the Brain Drain.” Paper prepared for the World Conference on Science, UNESCO-ICSU, Budapest, June 26 to July 1, 1999.
- Morales, Rebecca. *Redefining Borders: Labor Migration and National Sovereignty*. Working Paper No. 15 for the Center for US-Mexican Studies, University of California at San Diego (San Diego, CA: Center for U.S.-Mexican Studies, University of California, October 1992).
- Occupational Outlook Handbook* (Bureau of Labor Statistics, US Department of Labor, 2002). Available online at <http://www.bls.gov/oco/>; INTERNET.
- One-Stop Promising Practices – First Round By Location* [website]. Available online at <http://www.heldrich.rutgers.edu/LocationListing.htm>; INTERNET.
- O*NET Online [database] (National O*NET Consortium, US Department of Labor, 2002). Available online at <http://online.onetcenter.org/>; INTERNET.
- “Planning Guidance and Instructions for Submission of the Strategic Five-Year State Plan for Title I of the Workforce Investment Act of 1998 (Workforce Investment Systems) and the Wagner-Peyser Act.” (US Department of Labor, Employment and Training Administration). Available online at <http://usworkforce.org/pgfinal.htm>; INTERNET.
- Rosenthal, Neal H. “The Quality of BLS Projections: A Historical Account.” *Monthly Labor Review* vol. X no. X, (May 1999).
- Singapore: Your World of Possibilities* [website] (Contact Singapore, 2000). Available online at http://www.contactsingapore.org.sg/cs_home.htm; INTERNET.
- Smith, Adam. *An Inquiry Into the Nature and Causes of the Wealth of Nations* (New York, NY: The Modern Library edition by Random House Publishers, 1937).
- Special tabulations for “Survey of Earned Doctorates.” (Division of Science Resources Studies, National Science Foundation). Available online at <http://www.nsf.gov/home/menus/publications.htm> ; INTERNET
- Stewart, Thomas A. *Intellectual Capital: The New Wealth of Organizations* (New York, NY: Doubleday, 1997).
- usworkforce.org: Gateway to Information on the Workforce Investment Act* [website] (US Department of Labor, 2002). Available online at <http://usworkforce.org/>; INTERNET.

What Work Requires of Schools: A SCANS Report for America 2000. (The Secretary's Commission on Achieving Necessary Skills, US Department of Labor, June 1991).

WorkKeys® [database] (ACT, Inc., 2002). Available online at <http://www.act.org/workkeys/>; INTERNET.

World Development Indicators, 2000, on CD-ROM (Washington, DC: The World Bank, 2001); CD-ROM.

Endnotes

-
- ¹ Gary S. Becker, *Human Capital*, 2nd Edition (New York, NY: National Bureau of Economic Research, 1975). 1. See also the reading list for Becker's course in "Human Capital and the Economy" at the University of Chicago. It is available online at <http://www.src.uchicago.edu/users/gsb1/Econ357/syllabus.pdf>.
- ² K. N. Chaudhuri, *The Trading World of Asia and the English East India Company 1660-1760* (Cambridge, UK: Cambridge University Press, 1978), 273-274.
- ³ David S. Landes, *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor* (New York, NY: W.W. Norton & Co., 1998), 282.
- ⁴ Ibid., p. 290
- ⁵ Ibid., p. 283
- ⁶ Ronald E. Dolan and Robert L. Worden (eds) Chapter Three in *Japan, A Country Study* (Washington, D.C.: Library of Congress Federal Research Division, 1994). Available online at [http://lcweb2.loc.gov/cgi-bin/query/r?frd/cstdy:@field\(DOCID+jp0098\)](http://lcweb2.loc.gov/cgi-bin/query/r?frd/cstdy:@field(DOCID+jp0098)).
- ⁷ Thomas A. Stewart, *Intellectual Capital: The New Wealth of Organizations*, (New York, NY: Doubleday, 1997), 12.
- ⁸ Long-term plans were typically prepared for a five-year period, while short-term plans were annual and quarterly.
- ⁹ These remarks apply to the later Soviet period, the period of Khrushchev's reign and thereafter. They certainly do not apply to the harshest times of Stalin's rule. Furthermore, throughout the entire Soviet period, this comment obviously ignores the millions of persons consigned to forced labor in what Alexander Solzhenitsyn called the "gulag archipelago."
- ¹⁰ Neal H. Rosenthal, "The Quality of BLS Projections: A Historical Account," *Monthly Labor Review* (May 1999): 27-35.
- ¹¹ For the most recent edition, see <http://www.bls.gov/oco/>
- ¹² Rosenthal, op. cit.
- ¹³ Daniel Hecker, "Occupational Employment Projections to 2010," *Monthly Labor Review* (November 2001), 65.
- ¹⁴ The "surprise free" scenario is that trajectory of economic development that would least surprise the analyst if it came to pass.
- ¹⁵ See also the WorkKeys® databank of job profiles at <http://www.act.org/workkeys/> and the U.S. Department of Labor's O*Net database <http://online.onetcenter.org/>.
- ¹⁶ "The Learning Age: A Renaissance for a New Britain," a "green paper" produced by the U.K. Secretary of State for Education and Employment (1998). Available online at <http://www.lifelonglearning.co.uk/greenpaper/>.
- ¹⁷ Ulrich Herbert, *Hitler's Foreign Workers: Enforced Foreign Labor in Germany Under the Third Reich*, translated by William Templar (Cambridge, UK: Cambridge University Press, 1997).
- ¹⁸ Elizabeth G. Chambers, et al., "The War for Talent," *The McKinsey Quarterly* no. 3 (1998): 44-57.

-
- ¹⁹ George J. Borjas, *Heaven's Door: Immigration Policy and the American Economy* (Princeton, NJ: Princeton University Press, 2001).
- ²⁰ National Science Foundation, Division of Science Resources Studies, Survey of Earned Doctorates, special tabulations.
- ²¹ On the other hand, some express misgivings on the grounds that the competition from foreign-born scientists and engineers may depress earnings in these occupations and discourage native-born Americans from entering these fields. See Rebecca Morales, *Redefining Borders: Labor Migration and National Sovereignty*, working paper no. 15 (San Diego, CA: Center for US-Mexican Studies, University of California at San Diego, October 1992).
- ²² <http://www.canadasbraindrain.ca/home1.html>
- ²³ At this writing, there were 79 "Silicon Whatever's" associated with 105 world-wide locations listed on a website that tracks such arcana <http://www.tbtf.com/siliconia.html>
- ²⁴ Jean-Baptiste Meyer and Mercy Brown, "Scientific Diasporas: A New Approach to the Brain Drain," a paper prepared for the World Conference on Science, UNESCO-ICSU, Budapest, June 26 to July 1, 1999.
- ²⁵ Peter Marsh, "Idea of the Brain Drain 'Is Outdated'," *Financial Times*, December 20, 2001.
- ²⁶ See Jane J. Lommel, *Network: Maximum Access to Career Resources on the Internet* (Bloomington, IN: 1st Books, 2000). Also available online at <http://www.1stbooks.com>.
- ²⁷ See <http://www.monster.com> and <http://www.ajb.org/>
- ²⁸ See <http://www.usworks.com>
- ²⁹ *World Development Indicators, 2000, on CD-ROM* (Washington, DC: The World Bank, 2001)
- ³⁰ Richard W. Judy and Carol D'Amico, *Workforce 2020: Work and Workers in the 21st Century* (Indianapolis, IN: Hudson Institute, 1997), 11-15.
- ³¹ Lee Yock Suan, Singapore Minister for Trade and Industry, in a speech before Parliament on November 23, 1998. Available online at <http://www.gov.sg/mti/competitiveness/>.
- ³² Ibid.
- ³³ Lee Boon Yang, in a speech launching Manpower 21, August 31, 1999 <http://www.gov.sg/mom/speech/speech99/m990831.htm>.
- ³⁴ See <http://www.contactsingapore.org.sg/news/manpower21.htm>.
- ³⁵ To sample the products of Singapore's workforce information system, see <http://www.gov.sg/mom/manpower/manrs/manrs5.htm#lm98>.
- ³⁶ For a report on the program's progress, see *Employer Supported Training* (Singapore: Ministry of Manpower, September 2001), available on-line at http://www.gov.sg/mom/manpower/manrs/docs/op_16.pdf.
- ³⁷ See http://www.contactsingapore.org.sg/cs_home.htm.
- ³⁸ Many of these have websites. See <http://usworkforce.org/onestop/onestopmap.html>.

³⁹ Interested readers can savor those guidelines by consulting them at <http://usworkforce.org/pgfinal.htm>.

⁴⁰ See <http://usworkforce.org/asp/planstatus.asp>.

⁴¹ More information about the One Stop system can be found online at <http://usworkforce.org/onestop/index.html>; a list of 26 exemplary One Stop Career Centers in various states together with information about each of them is available online at <http://www.heldrich.rutgers.edu/LocationListing.htm>.