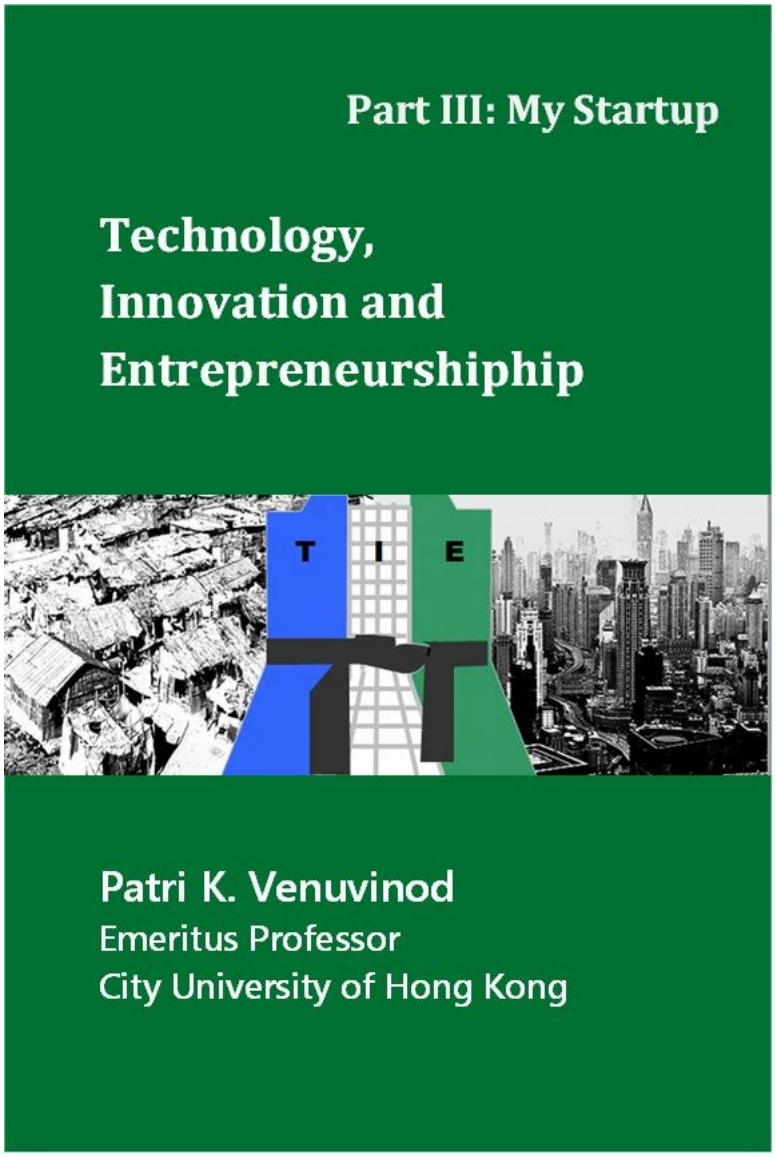


Technology, Innovation and Entrepreneurship
Part III: My Startup

By Patri K. Venuvinod

~~~

Dedication
~~~

To Mrudula, my wonderful wife.

~~~

Published by Patri K. Venuvinod at Smashwords

Discover two associated titles by Patri K. Venuvinod at Smashwords.com:

Technology, Innovation and Entrepreneurship, Part I: My World, My Nation

Technology, Innovation and Entrepreneurship, Part II: My Firm

~~~

Contents

~~~

About this Book

Back to top

Thomas Jefferson said "[E]very generation needs a new revolution." The revolution for the generations in the first half of the 20th century was socialism/communism. For the generations of the second half of the same century, it was the return to capitalism. For the current generation, it
~~~

seems to be entrepreneurialism.

Three insights concerning economic growth have become clear in recent times. First, the key to economic growth is technology (T). Secondly, innovation (I) is the driver of technology growth. Finally, entrepreneurship (E) is a highly powerful but extremely underappreciated contributor to innovation. Yet, there continues a paucity of academic books covering the large variety of issues impinging on TIE-exploitation from a contemporary viewpoint. This book is the third and final part of a textbook-trilogy that seeks to fill this gap.

Part I: My *World, My Nation* examined TIE interactions from a world-perspective but stressing nation building. *Part II: My Firm* discussed how an established firm could prosper in the contemporary world of globalized competition and technology. This third and final part—titled *My Startup*—discusses issues of particular interest to the growing number of youth pursuing an entrepreneurial career.

The origins of this trilogy lie in the class notes compiled by the author while teaching 'Management of Technological Innovation' to undergraduate and graduate students from science, engineering and business departments. The final contents have been influenced strongly by the insights derived by him while living and working in India, the UK, Hong Kong (including extensive travels to mainland China), and the USA. Thus, rather than focusing just on the lessons to be learnt from the experiences of a developed country such as the USA (as most books on the themes examined do), this trilogy empathizes with the biases and concerns of the developing parts of the world as well.

Among the topics examined in this book (Part III) are the relationship between entrepreneurship and the economy; individual, social and corporate creativity; education for creativity; innovation portfolio management; risk-taking; product development; innovation project management; entrepreneurship as a career; financing innovation and entrepreneurship; launching a startup; and lean startup principles.

~~~

Preface

Back to top

My childhood was spent in a small Indian township housing the largest Asian sugar factory of the time. Yet the town didn't even have a primary school. Consequently, I couldn't receive formal education till I turned nine. Only then could I be trusted to lug my school bag across water-laden paddy fields to a small government school located in a larger neighboring town.

The difference between the two towns was palpable. In keeping with their rural setting, people in my school-town were mostly steeped in age-old traditions, and religious or caste rivalries. This was in sharp contrast with the people in the industrial township I lived who tended to temper blind belief with rationality, dogma with pluralism, and disorder with organization. This contrast provided me with my earliest practical lesson in the power of technology as a vehicle for bringing forth social transformation.

My technicism led to a dilemma, though, as I approached graduation from my high school and started thinking about what I could/should become. The choice was obvious for most of my
~~~

classmates. A farmer's son would become a farmer, a grocer's a grocer, and a feudal landlord's a landlord. Being a technologist's son, none of these choices was immediately available to me. In any case, all were unexciting.

Meanwhile, independent India was struggling to find its road ahead. The "Father of the Nation", Mahatma Gandhi, passionately advocated a bottom-up, village-oriented approach underpinned by altruism. Technology was accorded only a peripheral role, if at all.

But, Gandhi's influence was already waning as that of Jawaharlal Nehru was rising. As India's prime Minister for seventeen years, Nehru pursued a national development strategy based on socialistic principles and central planning. (During his formative years, Marx's works were well-known while Schumpeter had not written his counter-thesis yet. Schumpeter gained some fame by the time Nehru became the prime minister. But, apparently, Nehru's mind had set by then.) Nehru also acknowledged the central role of technology in development and created a range of public sector industries which became vehicles for technology transfer mainly from the Soviet bloc. Taking cue from this trend, I joined an engineering college in the state capital in the hope of eventually becoming a public sector employee.

One of the few non-technical subjects we had to study was Economics. One would have thought that the syllabus of this subject reflected the prevailing Marxist bias. As it happened, the books prescribed dwelt essentially on classical capitalism. Further, my teacher was an eloquent laissez-faire enthusiast. All this exposed to me to the flipside of Nehru's strategy: it was ignoring the role of the individual through personal enterprise. In fact, individual entrepreneurship was being discouraged through elaborate licensing requirements. This didn't bother me since I, like most of my compatriots, believed that no public good can come out of greedy individuals.

Immediately upon obtaining my engineering degree, I proceeded to one of the premier institutes of technology in the country to specialize in design and production engineering. The particular institute I joined was set up with Soviet collaboration, so a good number of my professors were from the U.S.S.R. I learnt a lot about mechanical technologies from them but little about the new developments that were occurring in electronics and computers. There was also little curricular emphasis on the human and market sides of engineering.

My association with Russians and the like didn't end there as the UNESCO expert from the Soviet Union assessing my masters' thesis reacted favorably to it. He started persuading me to take up academic career at a newly established Regional Engineering College. The idea was that I would assist him on developing the curricula for eight post-graduate programs in technology across India. I agreed.

Over the next few years, I got associated with many more experts from the Soviet Union and Eastern Europe. From them I learnt more about technology and their countries where vertically integrated industries were producing the goods that the respective governments thought their citizens needed.

Next, I was selected to go to the U.K. as a UNESCO fellow to work on my Ph.D. The personal niche in technology (metal cutting) research I was to find there was to remain with me for the rest of my professional life. While in the U.K., I also spent some time at an ILO institute in Italy and secured a deeper appreciation of the role of technology in economic growth. These experiences helped me develop a more secular, and global outlook.

Upon receiving my research degree, I returned to my previous place of employment in India. The aura of my 'foreign' PhD helped intensify my research activity. It also made it easier for me to

initiate several non-curricular learning activities amongst students. For instance, noting that the college's curricula had not included management science as a subject of formal study, I organized interested students into what we called the Management Studies Group. Not everyone was happy, though, with our enthusiasm for management science. For instance, during an address to the group, the main message of our Principal was that 'management' was no more than a euphemism for worker-exploitation. Many others were also offended as the campus was rapidly becoming a hotbed of communism. The resulting tensions made me think about finding a place more conducive to academic pursuits.

A few years later, I moved to Hong Kong—then still a British colony. I worked at two different polytechnic-universities. At the first, I obtained a broad understanding of how Hong Kong ticked. Hong Kong was very different from India or the U.K. While India was still struggling to find its path and the U.K. was past its prime at least in terms of world domination in technology, Hong Kong was fast becoming a prominent 'Asian Tiger' despite being just a city state without any natural resources and little industrial history. It had already acquired international reputation in finance and manufacturing. In terms of manufacturing, it had developed well past the era of Productivity (P) into the era of Quality (Q). It achieved all this by pursuing free market capitalism based on thousands of horizontally integrated small and medium-sized private enterprises. The government assiduously pursued a hands-off policy believing that other social problems would be mitigated automatically as economic prosperity is achieved. The reliance on personal enterprise (entrepreneurship) seemed to infuse many a young person with confidence in the future. These observations made me more sensitive to the power of individual entrepreneurship in economic growth. I also became convinced of the importance of creativity and broad-based education in the preparation of youth for entrepreneurial careers.

All this preparation proved to be particularly useful when I became the founding head of the Department of manufacturing Engineering at a newly formed polytechnic-university in Hong Kong. I promptly set in motion several curricular and pedagogic experiments. The results only confirmed my convictions.

My 25-year stay in Hong Kong also provided me with ample opportunities not only to learn about but also to interact with mainland China. When I first arrived in Hong Kong, China had just embarked on a journey that was to lift some half a billion people out of poverty within the next 30 years. I had the good fortune of being chosen as a member of the first international delegation organized by some Hong Kong elders to visit China after Deng Xiaoping had declared China's "Open Doors Policy". This was only the first of many similar trips to come.

When I first went to South China, I found the place in a shambles following the self-inflicted injuries during the Cultural Revolution. Yet, today, the region is a thriving industrial complex actively contributing to China's well-earned reputation as the "factory of the world".

As I noticed during my subsequent trips to different parts of China, this was mainly the consequence of technological advancement resulting from technology transfer underpinned by unprecedented openness. Equally importantly, it was because the government managed to release the entrepreneurial energies of individuals without putting overall political stability in serious jeopardy. China was also wise in adopting the unprecedented "one country, two systems" policy with regard to post-1997 Hong Kong. The policy has already yielded rich dividends—Hong Kong's industrialists have been providing between 50 and 70% of FDI in China.

The above political developments suggested to us that our department's programs and curricula would have to recognize not only the local aspirations of Hong Kong but also how the territory

could contribute to the rest of China. In particular, we had to take into account the fact that Hong Kong needed to move on to the era of Innovation (I). Keeping this in mind, we sought to broaden our program portfolio beyond manufacturing engineering in a manner that would enable students to equip themselves for the coming era of innovation and entrepreneurship. We also introduced, for the first time in Asia, a bachelor's program in Mechatronic Engineering and a master's program in Engineering Management. The former emphasized the design of products and processes involving the integration of mechanical, electronic and computer elements. The latter sought to convert engineers into managers capable of conceiving and operating technology-intensive firms and startups. For over ten years, I personally taught the subject of Management of Technological Innovation (MTI) to both engineering and non-engineering students drawn from sub-degree to doctoral levels.

A major problem I encountered while teaching MTI was that there was no suitable textbook to support my teaching. Whereas I was seeking to examine technology, innovation and entrepreneurship (TIE) in fair detail and in an integrated manner, the existing text books focused on the management of the first while treating the latter two only in a cursory manner. Clearly, there was a need for a new book. It was then that I set upon writing this trilogy.

It took me several years of personal research and learning to come to grips with the book's contents. I embarked upon such an exercise immediately upon retiring from active service in Hong Kong and setting up residence in the U.S. My work was significantly helped by the fact that my immediate circle in the U.S. included several young, budding entrepreneurs. I learnt a lot by keenly observing their entrepreneurial trials and tribulations.

Upon retirement from formal teaching, I tried to disseminate in India the TIE lessons I had learnt abroad. I managed to bring together over twenty engineering colleges in and around Hyderabad to collaborate under the umbrella of International Organization of Developing Universities (IODevUni). One of the projects initiated by the Chapter was the application of the emerging e-learning technologies to facilitate the teaching of subjects for which member-colleges did not have enough experts.

E-learning enables students to learn anywhere at the pace, time and location of their choosing. The contents of an e-book itself can be updated frequently. One can also use the power of the Internet to build and sustain a learning community around the particular professor/subject. The learning community itself can contribute material such as case studies, adaptation to local and current conditions, and so forth. This is why this trilogy is being offered first in the form of e-books and a website called tecinnovent.com has been set up in its support.

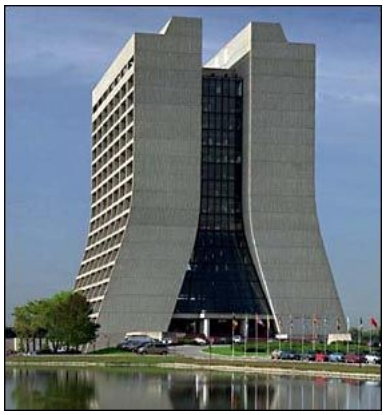
This trilogy is based on five premises that seem to hold in any economy irrespective of the 'ism' being followed:

~ The key to economic growth is productivity improvement through improved technology.
~ Innovation drives technology growth.
~ Competition spurs innovation.
~ Entrepreneurship consummates innovation.
~ The above four premises are equally applicable at the levels of nation-building, managing an existing firm, as well as launching a new venture or a startup.

The first four premises resonate with the recent arguments made by Edmund Phelps, 2006 winner of Nobel Prize for Economics, that general knowledge—encompassing business, technology, and the economic environment at large—is an important enabler of the virtuous

circle of creativity, innovation, and growth.

Following the last premise, this work is organized into three parts, each devoted to one of these three levels. The picture on the cover page seeks to capture the way each part is addressed. The shape of the central structure in the picture is inspired by Wilson Hall of Fermilab situated close to the author's residence in the suburbs of Chicago (see figure below). Till very recently, Fermilab had been housing the largest particle accelerator in the world. Thus it captures the central role of systematic science. Systematic science of course is the springboard for a great deal of modern technology.



Adapted from Fermilab website.

The central structure is made up of three parts labeled Technology (T), Innovation (I), and Entrepreneurship (E). This, of course, is in agreement with this trilogy's title. However, the intention is not just to examine T, I and E as themes worth studying in their own right, but also to 'tie' them together in a purposeful manner. Nations, firms and professionals who understand how the three elements can be synergistically united will enjoy a clear competitive advantage in the modern, globalized world. This emphasis on pulling T, I, and E together so as to beat the competition is reflected by the black belt around the central structure's 'waist'.

Part I consisting of Chapters 1 to 8 is titled 'My World, My Nation' as it explores the theme of TIE from a world-perspective but stressing nation-building. As citizens of the world and of a specific nation we all engage in animated discussions about some aspect or other of current trends and events in the world. This part aims to make such discussions more informed and purposeful. The issues discussed should be of particular interest to public officials/workers and those at executive levels.

Part II (Chapters 9 to 17) is titled 'My Firm' as it discusses the TIE theme from the perspective of how an existing firm or organization could prosper in the contemporary world of globalized competition. The issues discussed should be of particular interest to professionals and managers at all levels.

Part III (Chapters 18 to 26), titled 'My Startup', focuses on issues of particular importance to the growing number of youth across the world seeking an entrepreneurial career. It should also be of interest to serial entrepreneurs and intrapreneurs (mentors of entrepreneurial employees).

Although much of the material covered in the present trilogy is available in other books, few have put all of them together. The trilogy also includes several segments drawing on the author's research.

An examination of literature on the subject of TIE reveals a variety of discursive approaches. Some rely on a selection of case studies to find commonalities to arrive at a list of do's and don'ts. Some choose a particular sociopolitical belief system, e.g., capitalism or socialism, and use it to theorize. The method adopted in this trilogy is neither. The term 'evidence-based reasoning' captures the preferred mode of discussion.

Although the trilogy adopts an academic writing style, it should be useful to working professionals as well as general readers in addition to university students and researchers. It is not necessary that all the chapters are covered in a single semester. Depending on the course objectives, one can pick and choose chapters. There is enough material in the trilogy to engage students for 2 to 3 semesters.

Patri, K. Venuvinod

Emeritus Professor
City University of Hong Kong

~~~

Chapter 18
Entrepreneurship and the Economy

"I never perfected an invention that I did not think about in terms of the service it might give others... I find out what the world needs, then I proceed to invent."

— Thomas Alva Edison

Back to top

A recurrent message from our discussions so far is that much of the spectacular economic progress in recent times can be traced back to innovations in technology. Innovation is the primary driver of productivity in any nation and therefore of its prosperity and competitiveness. But a new technology doesn't by itself bring economic benefits. It must be understood and exploited with a view to creating a new market or penetrating an existing market. Only then does the society derive economic benefits from the technology. *Entrepreneurship* is the process by which an individual or a small group of individuals bridges this gap between invention and its commercial exploitation.

As observed by Thomas Jefferson, "[E]very generation needs a new revolution." The revolution for the generations in the first half of the 20th century was socialism/communism. For the generations of the second half of the same century, it was the return to capitalism. What about the current generation? Many would argue that it is *entrepreneurialism*.

Joseph Schumpeter, an Austrian-American economist, was the first to successfully persuade (in the 1930s and 1940s) people about the importance of entrepreneurship. But he also warned that
~~~

the bureaucratization of capitalism will eventually kill entrepreneurialism. Indeed that's what happened when, under the influence of Keynesian economics, governments around the world started to work with big business with a view to delivering orderly prosperity as opposed to the turmoil of creative destruction that Schumpeter had said was characteristic of entrepreneurialism. However, since the Reagan-Thatcher movement of the 1980s, the scene has radically changed in favor of entrepreneurialism. Today, the entrepreneurial idea is enthusiastically embraced by political leaders in left-leaning nations such as China, in mixed economies such as Denmark and India, and in right-leaning countries such as Singapore.

Thus, today, many governments are trying to outdo each other in making life easy for entrepreneurs. For instance, Denmark has established a network of "growth houses" that provide startups with consultancy advice, legal services, conference rooms, etc. Singapore has set up public venture capital funds that in turn have brought in private venture capitalists. India has been drawing heavily from its expatriates living in Silicon Valley and the like to kick start a strong entrepreneurial tradition. The list of national initiatives to promote entrepreneurship is indeed very long.

Why this sudden shift towards entrepreneurialism? The reasons are partly technological and partly sociopolitical. The invention of the personal computer, the mobile phone and the internet is democratizing entrepreneurship at a "cracking pace". The commercialization of cloud computing by Amazon and other players is allowing small outfits to enjoy the benefits which previously were available only to large organizations. As a result of such developments, entrepreneurs from almost anywhere can now challenge more easily established, large firms in developed countries. On the sociopolitical side, the reasons lie in the institutional framework needed to support entrepreneurialism. Respect for property rights, market orientation and individual freedom are essential for entrepreneurship to take root. Social and communistic states did not exhibit such respect. By contrast, such respect has always been a natural feature of the capitalist-democratic tradition. The world was sharply divided between the two "-isms" for much of the large century. The rivalry has now been resolved in favor of the capitalist-democratic structure.

The contribution of entrepreneurs to national economies can be assessed by looking at the contributions of the small and medium scale enterprises (SME). According to Ayyagari and Beck (2003), who reviewed the economies of 76 countries, SMEs contributed 51% of GDP in high-income countries, 39% in medium-income countries, and 16% in low-income countries. It appears that the contribution of SMEs increases as an economy develops. For instance, virtually non-existent in 1979 when China took its first steps away from central-planning orthodoxy, the number of its SME grew to 60m by 2009 (The Economist, 09/12/2009). Of these, more than 95% are privately owned. They are responsible for 66% of the country's patent applications, 80% of new products, and 68% of exports.

Thus, in the contemporary world, public policy developers and people involved in nation-building need to have an understanding of the nature of entrepreneurship and how it can be promoted. Such an understanding is essential for individuals seeking a challenging but rewarding career as an entrepreneur as well for professionals working in a corporate environment.

This chapter provides an overview of the basic principles associated with the notion, practice and promotion of entrepreneurship. Among the questions sought to be answered are: What is entrepreneurship? How can it be defined? What are the different types of entrepreneurial activity? Under what conditions does entrepreneurship thrive? Are there national differences in

entrepreneurial activity? How is entrepreneurial activity related to national growth? What can be done to enhance entrepreneurial activity?

What is Entrepreneurship?

Back to top

The English word "entrepreneur" comes from an Old French word, entreprendre, which means to undertake. In earlier days, the term was used in a derogatory manner while referring to get-rich-quick, fast-buck artists. Likewise the term entrepreneurship was used with reference to lending money for interest, especially at an exorbitant or illegally high rate. This view however changed progressively as new economic concepts were introduced (see Figure 18.1).

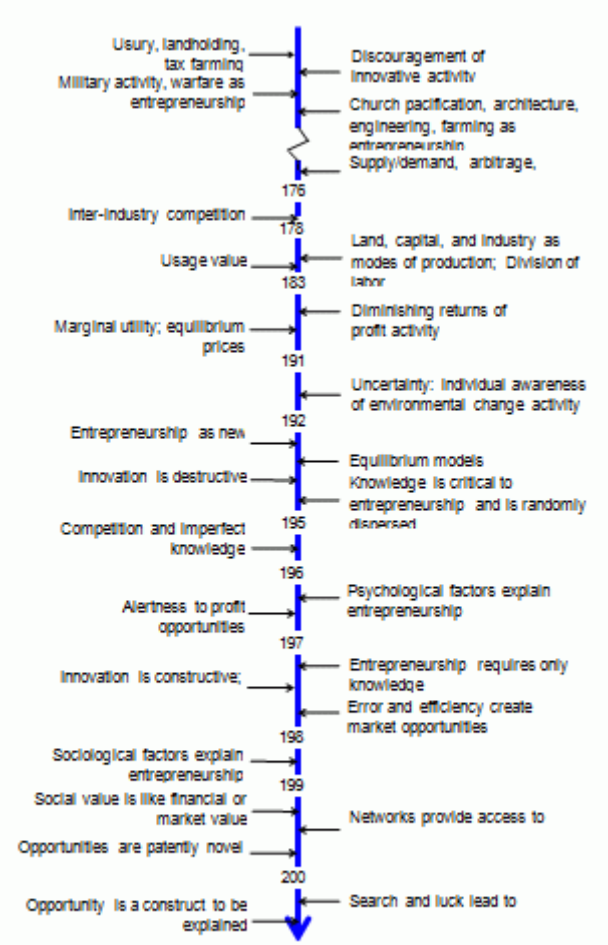


Figure 18.1 Conceptual development of "entrepreneurship" (adapted from Murphy et al., 2006).

Many people use the terms "entrepreneur" and "small business owners" synonymously because of similarities such as the fact that both create wealth by assuming risk. But, in modern practice, the term "entrepreneur" is mainly used with reference to individuals whose ventures have the potential to create substantially greater wealth and they do so much faster. Companies of such type are called *Entrepreneurial Growth Companies* (EGC). In the U.S., 5–10% firms are EGC. They account for nearly 2/3 of new employment each year as well as 2/3 of all technological innovation.

The majority of EGC tend to emerge in newly deregulated or emerging industries whereas most small businesses populate traditional industry sectors (construction, retail, personal service). While most small business owners just “make do” throughout their life time, many EGC have managed to create millions of dollars of wealth within the short span of a few years. Do they deserve such high rewards? They can indeed, if they assume substantially higher risks to engage in high innovation. Fortunately, a significant proportion of them do.

As early as in 1755, Richard Cantillon conceived entrepreneurship as judgmental decision making under conditions of uncertainty. However, the credit for coining the term 'entrepreneurship' is generally given to J.B. Say, another French economist, who defined the term around 1800. According to him an entrepreneur is someone who shifts economic resources out of an area of lower productivity into one of higher productivity and yield. The renowned British economist John Stuart Mill (1806–1873) recognized that entrepreneurship requires “no ordinary skill” and lamented the fact that there is no good English word equivalent to the original French word. Likewise another British economist, Alfred Marshall, asserted in his celebrated treatise, Principles of Economics (1890), that entrepreneurs play the pivotal role of organizing and coordinating the three other factors of production, namely land, labor and capital. By creatively organizing, they create new commodities or improve the production of an old commodity. They are able to foresee changes in supply and demand and act on risky forecasts based on uncertain information. Marshall noted that the skills of entrepreneurship are “so numerous and so great that very few people can exhibit them all in a very high degree.”

In the U.S. today, an “entrepreneur” is usually understood as one who starts his/her own, new, and small business. But not every new small business represents entrepreneurship. According to Drucker (1993), to be recognized as entrepreneurial, the new business must create a new satisfaction or consumer demand. By this definition, you are not necessarily being entrepreneurial when you open a small fast food shop in your neighborhood. On the other hand, Richard and Maurice McDonald were engaging in entrepreneurship when they opened their first restaurant in San Benardino, California, in 1940 because of the several innovations such as the “Speedee Service System” introduced by them defined the modern fast-food industry.

The following definition perhaps combines the varied views presented above: “Entrepreneurship is the process of creating something new with value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting rewards of monetary and personal satisfaction and independence (Hisrich & Peters, 1995).” Putting it more dramatically, entrepreneurship is a “world of patterns within patterns, jagged edges, unpredicted behavior, sudden leaps, where the whole is more important than the constituents (Bygrave & Hofer, 1989).”

In a sense, an entrepreneur is a manager since, in addition to working on his own, he also has to ‘get work done through others.’ However, unlike most (bureaucratic) managers who run ongoing activities, an entrepreneur starts one or more new economic activities. Thus, entrepreneurs distinguish themselves from conventional managers along two dimensions: (i) desire for future change, and (ii) perceived ability to create change (Stevenson & Gumpert, 1985). Table 18.1 highlights the differences in the questions facing the two. A bureaucratic manager typically seeks solutions to existing problems through the exercise of rationality while an entrepreneur seeks to create fruitful problems and tries to solve them through some rationality coupled with much intuition and gut feeling.

Table 18.1 Differences in the questions asked by managers and entrepreneurs (Betz, 1998).	
Bureaucratic Manager	Entrepreneur
How can I improve the efficiency of my operations?	Where is the opportunity?
What opportunity is thus important?	How do I exploit it?
What resources do I control?	What resources do I need?
How can I minimize the impact of others on my ability to perform?	How do I gain capital control over them?
What structure determines our organization's relationship to its market?	What structure is best to exploit the opportunity?

The Importance of Entrepreneurship

Back to top

The credit for persuading people of the importance of entrepreneurship as the main factor contributing to national economic growth is generally given today to Joseph Schumpeter. Schumpeter (1934) equated entrepreneurship with the concept of innovation applied to a business context. He also emphasized the role of entrepreneur as the *prime cause* of economic development by describing how the innovative entrepreneur challenges incumbent firms by introducing new inventions that make current technologies and products obsolete. This process of creative destruction is usually referred to as Schumpeter Mark I regime. Later, in 1950, he turned his attention to innovative activities by established large firms and described how large firms outperform their smaller counterparts through a strong feedback loop from innovation to increased R&D (Schumpeter, 1950). This process of creative accumulation rather than creative destruction is now generally referred to as Schumpeter Mark II regime.

Looking back into recent history, it may be said that much of 20th century could be characterized by Mark II regime—at least in the industrialized West. This was a period of "scale and scope (Chandler, 1990)"— when many hierarchical industrial firms grew progressively larger through exploiting economies of scale in areas like production, distribution, marketing, and R&D. However, by the end of the 20th century, it became clear that a regime-switch had taken place in many countries (an exception is Japan) with GDP per capita higher than US$20,000 (Carree et al., 2002). For instance, already in the period 1969 to 1976, firms with fewer than 100 employees were creating 80% of new jobs in the U.S. (Weinberg, 1987).

Whatever be the regime, Schumpeter was concerned mainly with the "high-level" kind of entrepreneurship that had led to the creation of railroads, the birth of the chemical industry, the commercial exploitation of colonies, and the emergence of the multidivisional multi-national firm. His analysis did not pay much attention to the much more common, but no less important, "low-level" entrepreneurship carried on by small firms. It also ignored the importance of entrepreneurs in less developed countries who mainly engage in "creative imitation."

Nondestructive Creation

Back to top

Until recently, the prevailing economic view of entrepreneurship and the associated public policies had centered on Schumpeter's interpretation of it as "creative destruction." This interesting but depressing choice of words has fueled much anxiety among policymakers as it implied that "creation" is invariably accompanied by an equal measure of "destruction." "Like a forest fire that sweeps out old underbrush and makes room for hardier new growth, an entrepreneur, Schumpeter said, competes with established (and often moribund) businesses, undermining their business models in favor of newer, more effective, and more resilient technologies, products, and services (Hubbard, 2007)." This classic Schumpeterian view has recently been challenged credibly by Edmund Phelps, the winner of 2006 Nobel Prize for Economics (Phelps, 2003, 2006).

Phelps points out that, in fact, a great deal of creation is nondestructive in the sense that, rather than replacing existing products and services, the innovation promotes and satisfies new demands. For instance, according to a Yale University survey, about 70% of the products and services consumed in 1991 bore little resemblance to those consumed 100 years earlier (The Economist, 03/12/2009). And even in cases some businesses have been destroyed, the aggregate destruction is usually much smaller than the aggregate creation resulting from the innovations.

Phelps' view of entrepreneurial activity is fundamentally different from that of Schumpeter. Schumpeter's entrepreneur was not a "rational economic calculator" but a relatively unfettered and unpredictable force. Thus Schumpeterian entrepreneurship depends on uncoordinated activity, one conducted without central direction or planning. The entrepreneur's contribution to society was seen as a kind of unavoidable pain. An entrepreneur, Schumpeter said, competes with established (and often moribund) businesses, undermining their business models in favor of newer, more effective, and more resilient technologies, products, and services. Even with that valuable net result, the Schumpeterian view has led many people to regard capitalism as a turbulent milieu in which neither the economic winners nor the losers ever get to enjoy stability in which the uncoordinated contest of ideas and search for new applications of existing ideas generate growth. Thus the credit for conceiving much of the "clinical research" or experimentation that constitutes the bulk of contemporary innovation goes to business people rather than scientists and technicians. Entrepreneurially minded business leaders do not set an unchanging goal. Rather, they succeed as agile seekers looking for many different ways to identify and capture opportunity. The innovations they undertake involve making judgmental decisions about the coordination of scarce resources (Lazear, 2005).

For instance, in retail trade, firms did not become more productive just by buying faster computers. Entrepreneurs and entrepreneurial managers raised productivity by combining investments with changes in business practices such as the use of IT to improve links in the supply chain from vendor to retailer. As a result, since 1995, productivity has been growing at a rate that implies a doubling of living standards each generation. Thus entrepreneurial societies usually exhibit heightened economic dynamism. Greater the dynamism greater is the potential for growth.

Measures of Entrepreneurial Activity

Back to top

In response to the growing interest in entrepreneurship as a driver of national economies, many institutes have emerged in recent times to research international trends in entrepreneurship development. Foremost among these are the World Bank and the Global Entrepreneurship

Monitor (GEM).

The World Bank defines entrepreneurship as "the activities of an individual or a group aimed at initiating economic activities in the formal sector under a legal form of business (WB, 2009)." It measures the degree of formal business activity under the term business density defined as the number of firms per 1000 active persons (of 15–64 years age). Business density ranges from less than 1 percent in many low-income African countries to 23 percent in Australia. The average business density is about 0.05.

However the term entrepreneurship is devoted only to a subset of business activity, the part devoted to startups. The bank's unit of measure for this part is entry rate defined as "new firms (those that were registered in the current year) as a percentage of lagged (one year before) total registered firms." Entry rates are found to range from less than 5 percent in India and Pakistan to almost 20 percent in Germany, New Zealand, and the United Kingdom. Entry rate is found to be positively correlated with GDP PPP (see Figure 18.2) thus confirming that entrepreneurship does contribute to national economic well-being.

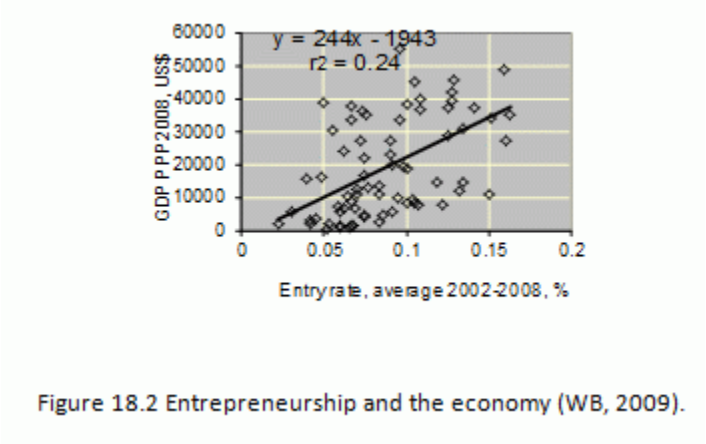


Figure 18.2 Entrepreneurship and the economy (WB, 2009).

With regard to the distribution of businesses across various sectors, there seems to be almost perfect asymmetry between developing and industrial countries. The share of businesses in industries such as wholesale, retail trade and finance sectors exhibiting lower requirements for investment, human resources, knowledge, and capital is twice that in industrial countries. In sharp contrast, the share in manufacturing and services is only half as large.

As we have already noted, the World Bank data refers solely to formally registered businesses. However many economies have an informal sector (or "shadow economy") too that plays an important role in many countries, ranging from over 75% of official GDP in Nigeria to about 10% in the United States in 2000 (Schneider & Enste, 2000). To cope with this problem, GEM has introduced the notion of Total Entrepreneurial Activity (TEA index) that includes both formal and informal entrepreneurial activities. The index is defined as the percent of the labor force that is either actively involved in starting a new venture or the owner/manager of a business.

Types of Entrepreneurship

Back to top

It has been found that there exists a U-shaped dependence of early-stage entrepreneurial activity on the degree of economic development of a nation—see Figure 18.3. Development economists

explain this by distinguishing the three stages of economic development described below (Syrquin, 1988):

Stage 1: The economy specializes in the production of agricultural products and small-scale manufacturing. This stage is marked by high rates of non-agricultural self-employment. The majority of self-employed individuals are in small manufacturing.

Stage II: The economy shifts from small-scale production toward manufacturing, so there is a decrease in self-employment. As the economy becomes wealthier the average firm size increases and the larger firm is able to muster greater capital (to support use of superior technology) through private enterprise, direct foreign investment, or government ownership. This means marginal managers are able to earn more money while being employed by somebody else. Consequently fewer people pursue entrepreneurial activity.

Stage III: With increasing wealth, the economy shifts away from manufacturing toward services. Service firms are smaller on average than manufacturing firms and they provide more opportunities for entrepreneurship. Further, in the post-War period there has been an explosive growth in information and communication technologies which are more easily exploited in the service sector.

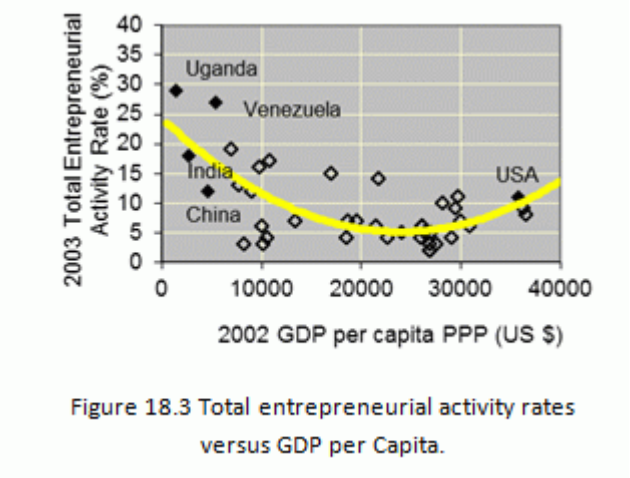


Figure 18.3 Total entrepreneurial activity rates versus GDP per Capita.

Another possible reason for the U-shaped curve is increased formal rather than informal entrepreneurship as the nation progresses economically. When the country is poor, the society is more disorganized and law and order are lax, so there is no incentive to bother to register every new venture. The opposite is true in a developed economy (we know from Figure 18.2 that formal entrepreneurship and economic prosperity are positively correlated).

Further, a similar U-shaped curve was noticed by van Stel et al. (2004) when they studied the impact of entrepreneurial activity on GDP growth: for poorer countries the impact was negative while it was positive for developed countries. They attributed this mainly to the fact that enough large companies are not present in poor countries. The training obtained in large firms helps young entrepreneurs increase their competencies needed for engaging in productive entrepreneurship. Further, smaller companies flourish around larger companies as suppliers of components and expertise. In fairness, these facts support Nehru's emphasis on the public sector during the earlier years of independent India. The problem was that few steps were taken to complement the emphasis with encouragement of individual entrepreneurship. Worse still, the latter was positively discouraged.

From the society's point of view, entrepreneurs can be divided into productive and unproductive types. What is important for the society is that the entire *production possibility frontier* (PPF) is moved outward (Kirzner, 1973; Baumol, 1990). Entrepreneurs able to achieve this are said to be productive. Unproductive entrepreneurs might be benefiting but their ventures do not shift the PPF. In contrast, productive entrepreneurs are motivated by challenge associated with advancing the PPF and independence (in addition to, of course, money). Schumpeter (1950, 1961) considered only productive entrepreneurs to be innovators irrespective of whether they are arbitrageurs (those who take advantage of imbalances between markets) (Kirzner 1973), those who bet on ideas (Mokyr 1990), or forecasters and capitalists (Rothbard, 1962).

Productive entrepreneurs come in two types: 'replicative', and 'innovative' (Baumol et al., 2007). *Replicative entrepreneurs* produce or sell goods or services already available through other sources. The original definition of entrepreneurship proposed by Cantillon in the 18th century was actually referring to this type of entrepreneurship. Such entrepreneurship continues to represent a route out of poverty for people with little capital, education or experience. Most small businesses belong to this category.

But if economic growth beyond the individual is the objective, it is the innovative entrepreneur who matters. An *innovative entrepreneur* is one who has created a business "that provides a new product or service or develops and uses new methods to produce or deliver existing goods and services at lower cost (Baumol et al., 2007)." Schumpeter was celebrating the role of this type of entrepreneur. The term "creative destruction" he coined was referring to the activity and impact of this type of entrepreneurship.

To productive and unproductive entrepreneurship, we can add a third category: *evasive entrepreneurship* (Coyne & Leeson, 2004). "Evasive activities include the expenditure of resources and efforts in evading the legal system or in avoiding the unproductive activities of other agents. Tax evasion is one readily apparent example of evasive activities, as are bribes paid to regulators or inspectors used to evade onerous regulations."

An empirical finding by Global Entrepreneurship Monitor (GEM) is that as much as 97% of total entrepreneurial activity (TEA) is motivated by either necessity or opportunity. Necessity (or, *survival*) entrepreneurs become involved in entrepreneurial activities as a last resort when other options for work or participation in the economy are absent or are considered unsatisfactory. *Opportunity entrepreneurs*, in contrast, do so voluntarily in search of independence, challenge or money. About two-thirds (174 million) in the GEM 2002 survey were opportunity entrepreneurs with the rest being necessity entrepreneurs (GEM, 2002). Around 50% of TEA was directed towards retail, hotels and restaurants; 11% towards manufacturing; 10% towards wholesale, motor vehicles sales and servicing, and 8% towards business services. More than one in four expected to provide more than 20 jobs in five years.

Opportunity entrepreneurs who choose an entrepreneurial career in pursuit of independence through self-employment are called *lifestyle entrepreneurs*. The majority of these are content as long as their self-employed status provides the means necessary to subsist. Some however seek the greater challenge of creating wealth and jobs for the community through the pursuit of more innovative ventures. They are also prepared to take greater risks. Once successful, many of these innovative or growth entrepreneurs become *serial entrepreneurs* by creating several new businesses over their respective lifetimes.

Figure 18.4 shows the variations in the extent and nature of entrepreneurial activity across a selection of regions. Note the substantial variation in the intensity of entrepreneurial activity

(measured as the percentage of adults between 18 to 64 years of age engaged in some entrepreneurial activity—Total Entrepreneurial Activity, TEA) across nations. Overall, about one third of startups become functioning businesses. About 20% expect to have over 20 employees in five years.

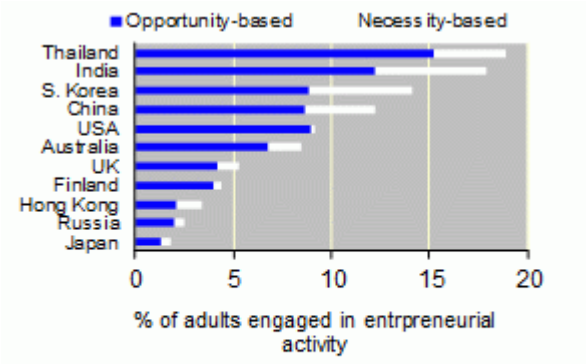


Figure 18.4 National variations in entrepreneurial activity (GEM, 2003).

The bulk of entrepreneurial activity is in developing countries. Among the countries exhibiting a very high level of TEA are Thailand, India, South Korea and China. The lowest intensity is found in Japan. This is surprising given the maturity of Japanese industry and the high level of innovativeness it has been exhibiting. Among the reasons for the low entrepreneurship in Japan are the dominance of existing large companies in the employment market, the traditional preference for lifelong employment by companies, a preference for not having outsiders on the board of directors, a cultural preference for non-confrontational indirect communications, the absence (in the past) of a legal/regulatory framework (IP ownership, bankruptcy laws, etc.) that is friendly to startup companies, and the absence of Silicon Valley-style venture capital community.

Figure 18.4 also indicates that opportunity entrepreneurs dominate more in developed countries than in developing countries. For instance, while almost 100% of TEA is made up of opportunity-based entrepreneurship in the U.S., in India it is only around 60%. As more and more of the population becomes involved in opportunity entrepreneurship and as more and more people leave necessity entrepreneurship (self-employment), the more we see rising levels of economic development.

Figure 18.5 shows the sectoral distribution of entrepreneurship. The greatest levels of entrepreneurship are found in consumer-oriented industries while the lowest are found in extractive industries. In the middle order are transforming (manufacturing) industries and business services.

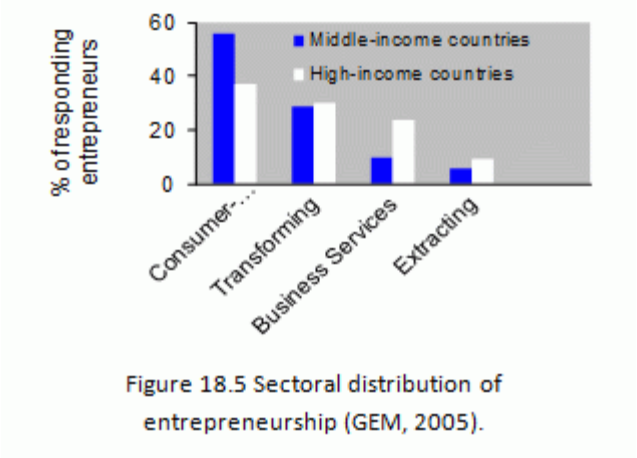
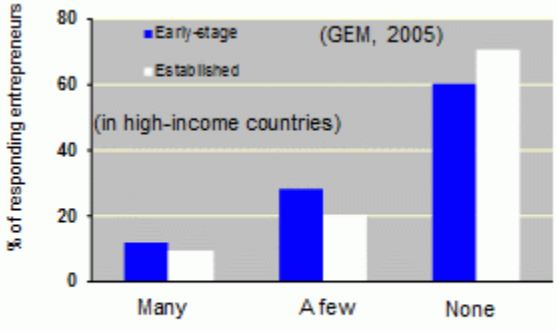


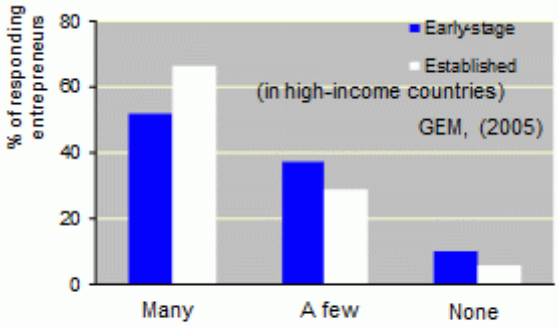
Figure 18.5 Sectoral distribution of entrepreneurship (GEM, 2005).

As we have already noted, Schumpeter (1934) had highlighted the role of innovation and entrepreneurship as an act of creative destruction through the introduction of new products and processes, and increases in productivity. Thus entrepreneurship can be viewed as an expression of novelty and dynamism (Hart, 2003). On this basis, GEM has defined three aspects of an innovation's potential value: product novelty, competitor differentiation, and the use of technology.

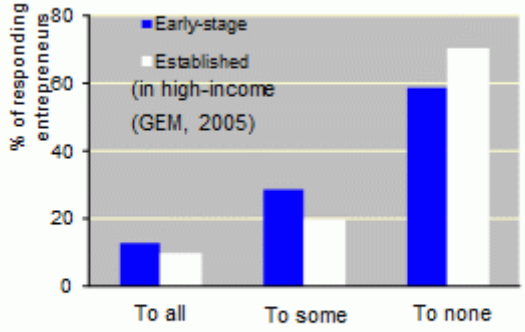
Figure 18.6a shows the patterns observed with regard to product novelty, which can be used as a measure of the innovativeness exhibited by the entrepreneur concerned. Note that the majority of businesses offer products or services that are not new to customers. Only a small fraction of entrepreneurs claim that what they offer is new to all customers. Early-stage entrepreneurs claim more often to offer innovative products than established entrepreneurs, while the latter say more frequently that their products are not new to any customer. These patterns are exhibited by developed as well as developing countries, thus suggesting that the differences between the innovativeness of entrepreneurs in both country groups are insignificant.



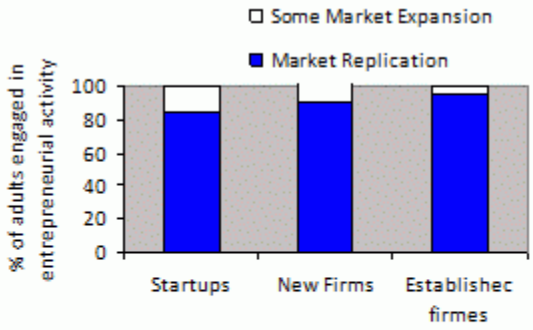
a) Product new to how many customers?



b) How many businesses offer the same product?



c) How new are the technologies or procedures?



d) Market replication versus expansion (GEM, 2002, 2003).

Figure 18.6 Some national patterns of entrepreneurship.

Figure 18.6b shows the patterns observed with regard to competitor differentiation. A large proportion of entrepreneurs say that they expect to face many competitors in their market. Not surprisingly, established business owners face more competitors than early-stage entrepreneurs. This could either be of the higher innovative potential of those who are just starting out or just because of the over-optimism on their part as a result of limited market knowledge. Early-stage entrepreneurs from high-income countries are slightly more optimistic about the expected level

of competition while no significant differences are observed with regard to established business owners.

Figure 18.6c shows the pattern observed with regard to the use of new technologies by entrepreneurs. Surprisingly, both early-stage and established entrepreneurs from the middle-income country cluster claim to be using the latest or newer technologies more often than their counterparts from high-income country cluster. However, as they are operating within a low-technology environment, it is likely that entrepreneurs from middle-income countries interpret the term 'new technologies' in a relative sense. Some of the technologies that are already standard and common knowledge in advanced economies might still be considered novel in more primitive societies.

Combining the above three sets of patterns, overall, the growth potential is highest for those firms that offer a product or service that seems to be new to all customers, expect no competition, and use the latest technology. Conversely, growth potential is the lowest for entrepreneurs entering an existing market with high competition and an established technology. Such entrepreneurs essentially imitate existing business ideas. At the same time, it must be recognized that they have a positive impact on the economy by increasing the level of competition.

The most prevalent image of entrepreneurship is that it is associated with a venture that is new, unique or different—in short, something innovative. In other words, it provides a good or service that had not previously been available thus, in effect creating a new market. Schumpeter's model of "creative destruction" reflects this image. However, owing to market considerations, innovative ventures vary considerably in terms of growth potential. Figure 18.7 shows one classification of entrepreneurial ventures from this viewpoint.

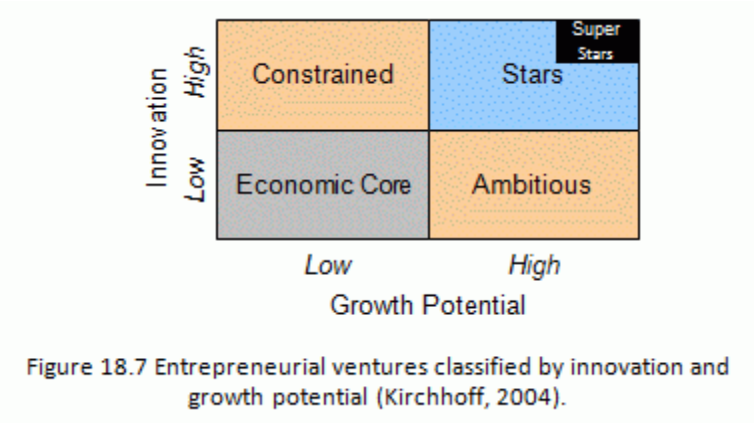


Figure 18.7 Entrepreneurial ventures classified by innovation and growth potential (Kirchhoff, 2004).

It is therefore useful to examine how many entrepreneurs indeed create new markets and how many merely replicate of existing business activity either in its entirety or in a new form, at a new location, using new procedures, or with a new price structure. Figure 18.6d shows some results obtained by GEM in this regard. Note that, by contrast with the popular image, the majority of entrepreneurial activity ends up as market replication. However, this does not mean that this mode is of no use. It indeed serves the purpose of expanding the existing market and, equally importantly, raising the level of competition in the market thus driving down prices and improving quality. With regard to market creation, startup companies typically contribute more to market creation than established firms.

Finally, consider the classification of entrepreneurship on the basis of the expected impact on

society whether measured in terms of the wealth created or the provision of new job opportunities. From this viewpoint GEM (2005) distinguishes between two types of entrepreneurship: 'high expectation' and 'low expectation'. High-expectation entrepreneurial *activity* is defined as all early-stage businesses that expect to employ at least 20 employees within five years. This may not appear like much but we must recognize that growing to a size of 20 employees is not simple. This criterion also ensures that the business is a going concern with its impact extending beyond the local vicinity.

How prevalent is high-expectancy entrepreneurship? According to the surveys conducted by GEM (2005a), just 0.2% to 1.6% of adult population in different countries is engaged in high-expectancy entrepreneurship. Further, less than 10% of all early stage entrepreneurial activity can be characterized as high-expectation entrepreneurship. However, these statistics should not be interpreted as suggesting that high-expectancy entrepreneurship is not important. This is because high-expectancy entrepreneurship accounts for almost three-quarters of the total expected job creation within five years, with less than 5% expecting to create over 62% of all new jobs by employing more than 50 employees. Governments should therefore be sensitive to the conditions that promote high-expectancy entrepreneurial activity and consider introducing appropriate measures and policies. Here are some findings from GEM in this regard:

~ High household income, high education level, and opportunity motivation are most strongly associated with high-growth expectations. 4.4% of well-educated males with high income participate in high-expectation activity. These factors seem to be particularly prevalent in the U.S., Canada, Australia and New Zealand where between 1% and 1.6% of adults are engaged in high-expectancy entrepreneurship. However, it is interesting to note that European and highly developed Asian countries such as Hong Kong, South Korea, Japan, and Singapore, have the lowest rate (approximately 5%) of high-expectation activity at approximately 0.5%. This suggests that certain socio-cultural factors other than education and opportunity are at play.

~ High-growth expectations peak at young to middle age. Young (25 to 34 years old) and middle-aged entrepreneurs tend to have higher growth expectations than older entrepreneurs.

~ High-expectation entrepreneurial activity varies significantly between industrial sectors. Manufacturing and business services sectors attract the highest proportion while retail trade, hotel and restaurant businesses experience the lowest levels of high expectation activity despite showing the highest levels of overall entrepreneurial participation.

~ The more involved an individual is with various kinds of entrepreneurial activity, the more likely that individual is to engage in high-expectation entrepreneurial activity. This suggests that cultivating serial entrepreneurs, as well as increasing the population's general exposure to entrepreneurial activity, may foster high expectation entrepreneurial activity.

Social Entrepreneurship

Back to top

So far we have focused on the use of entrepreneurship in profit-making businesses. This doesn't mean that the motivation for starting the business has to be totally mercenary always. For many an entrepreneur, the real motivation is passion for seeing a specific idea to its consummation. But in practice the consummation is sustainable only as long as the venture keeps making adequate surplus. However, starting from around 1970, the success of entrepreneurship in the profit-making world has been spilling over into nonprofit organizations as many such organizations

have started using entrepreneurial principles hitherto used extensively by profit-making organizations. Individuals (or small groups) spearheading such principles are known as 'social entrepreneurs'.

"A *social entrepreneur* is someone who recognizes a social problem and uses entrepreneurial principles to organize, create, and manage a venture to make social change (Wikipedia)." Just as business entrepreneurs create and transform industries, social entrepreneurs act as change agents for the society by inventing and disseminating new approaches and advancing sustainable social value. While traditional business entrepreneurs who mainly seek profits, social entrepreneurs primarily seek to generate social value. Social entrepreneurs try to solve social problems by themselves rather than leave them to governments. "Social entrepreneurs identify resources where people only see problems. They view the villagers as the solution, not the passive beneficiary. They begin with the assumption of competence and unleash resources in the communities they're serving." Classical examples of social entrepreneurs include the following:

~ Dr. Maria Montessori (1870–1952), an Italian physician who developed the Montessori approach to early childhood education,
~ Vinoba Bhave (1895–1982), who founded the Land Gift Movement in India and caused the redistribution of more than 7,000,000 acres of land to aid India's untouchables and landless.
~ Florence Nightingale (1820–1910), a British duchess who founded modern nursing.

However, at the time of these classical social entrepreneurs, there was little understanding of entrepreneurship in general. In fact, the term 'entrepreneur' had derogatory overtones suggesting a tendency towards making a fast buck.

A well-known contemporary example of a person consciously applying principles of entrepreneurship is Muhammad Yunus, a Bangladeshi and the winner of the Nobel Peace Prize in 2006. Yunus passionately pursued the social cause of providing self-employment opportunities to destitute people through the provision of small loans (microcredit). Being destitute, these people could not provide the collateral needed to secure loans from traditional banks. No conventional bank following Adam Smith's competitive principles would come near them. So Yunus launched his own microcredit bank, called the Grameen Bank, which provided the loans without insisting on any collateral (Yunus, 2003, 2008). The bank developed an institutional culture which compensated for the lack of collateral by working with the loan recipients bottom up to educate them on the need to pay back the loans in small installments. It also took steps to transfer the liability from individual borrowers to a group. It charges a higher interest rate but bases it on the diminishing principal. More than 6 million people have borrowed money from Grameen and the bank makes millions in profit. "Grameen believes that charity is not an answer to poverty... It creates dependency... Unleashing of energy and creativity in each human being is the answer to poverty." Hence Grameen works bottom up and provides minimal credit to poor people, educates them of the need to pay that money back in small installments, and also provides them guidance, social values, etc. Looking ahead, Yunus envisions a new "social stock market" for investors, and to "defining entrepreneur in a broader way [so that] we can change the character of capitalism radically.

Corporations can also participate in social entrepreneurship, as the following story suggests:

In May 2000, a group of software experts from Tata Consultancy Services, India launched the Computer Based Functional Literacy (CBFL) program under the leadership of Faqir Chand Kohli, who is often referred to as the Father of Indian software industry. The aim of the program was to help solve India's illiteracy problem by adopting the pioneering concept of 'Functional

Learning'. The team thought of a process where illiterates could be taught to visually recognize on a computer monitor 300 to 500 words in their own language within 30 to 45 hours spread over 10 to 12 weeks. Since most Indian languages are phonetic, there would be no problem and they would learn the alphabet after learning the words. Today the CBFL project is operational in more than 1,000 centers in various parts of India and has helped more than 20,000 people learn the most basic of the three R's: reading. The technology has already spread to many other countries including Fiji, Yemen, Nigeria, and Tunisia and has been licensed to manufacturers in India, Brazil, China, South Africa, and France.

Clearly, in contrast to Phelps who believes in transformative entrepreneurship, Yunus believes in ameliorative entrepreneurship. But, notwithstanding its romantic charm, is ameliorative entrepreneurship sustainable in general? Should governments pursue it as an important means of fighting poverty while assuring economic growth? Professor Amar Bhidé of Columbia University doesn't think so. He points out that Yunus' microloans are activities that were marginalized by modern entrepreneurs as they don't involve any economies of scale or scope or the use of new technologies capable of producing significant advances in overall productivity. Hence the ameliorative entrepreneurship can only be a fringe activity. Bangladesh's poverty stems from their comprehensive backwardness—"bad roads, illiteracy, inadequate health care, unsound banks, porous tax collection systems, disorganized land records, corrupt policemen and so on." There is no historical precedent for sustained economic development at the national level without broad-based modernization and widespread improvements in productivity brought about by the dynamic entrepreneurship that Phelps advocates.

The increasing concern for the four billion or so people who are today living under $2 per day has prompted several experts to develop theories targeted at them. These people are today generally referred to as people (consumers and entrepreneurs) at the "Bottom (or Base) of the Pyramid", i.e., BoP.

C.K. Prahalad of Michigan University recently looked at several social entrepreneurship projects in progress in poor countries and came to the bold conclusion that the four billion poor can be the engine of the next round of global trade and prosperity, and can be a source of innovations. He noticed that, even though poor, BoP people

~ are not inaccessible. Unconventional approaches such as those followed by Avon may work.
~ are brand-conscious.
~ are highly connected through mobile phones, TV, and the internet.
~ are very much open towards new technology.

All the above means that, contrary to the belief system held currently by many MNC, it is possible to make profit by serving the needs of not just the rich and the middle class but also of BoP. "If we stop thinking of the poor as victims or as a burden and start recognizing them as resilient and creative entrepreneurs and value-conscious consumers, a whole new world of opportunity will open up (Prahalad, 2004)." In particular, he recommended that private enterprises, development and aid agencies, Bottom of the Pyramid consumers, Bottom of the Pyramid entrepreneurs, and civil society organizations including the local government engage in co-creation towards economic development and social transformation (see Figure 18.8).

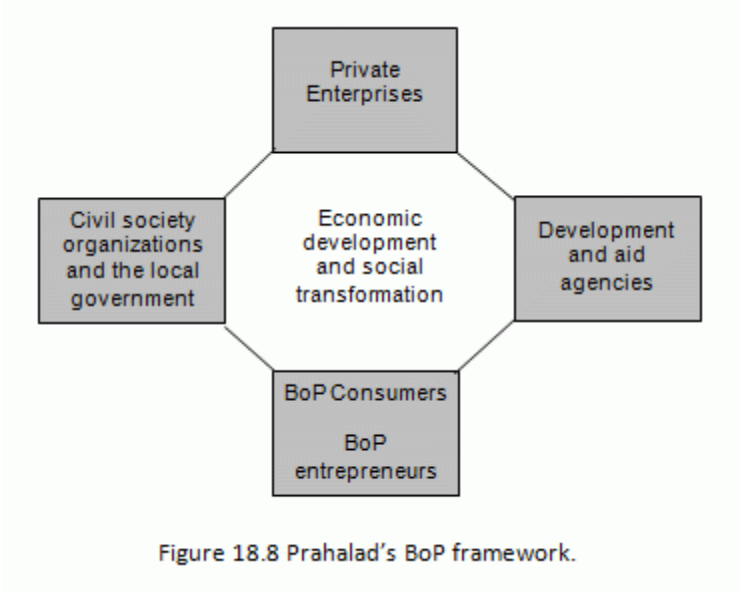


Figure 18.8 Prahalad's BoP framework.

Interestingly, as evident from the following list of building blocks for such co-creation, Prahalad depends significantly on leveraging technology, innovation and entrepreneurship, the three interlocking themes of the present trilogy:

~ Focus on quantum jumps in price performance.
~ Aim for hybrid solutions, blending old and new technologies.
~ Develop scalable and transportable operations across countries, cultures, and languages.
~ Reduce resource intensity, for instance, by pursuing eco-friendly products.
~ Radically redesign products from the beginning: marginal changes to existing Western products will not work.
~ Build logistical and manufacturing infrastructure.
~ Deskill services work.
~ Educate (semiliterate) customers in product usage.
~ Make sure products work in hostile environments: noise, dust, unsanitary conditions, abuse, electric blackouts, water pollution, and so forth.
~ Develop adaptable interfaces to heterogeneous consumer bases.
~ Develop distribution methods capable of reaching both highly dispersed markets and highly dense urban markets.
~ Focus on broad architecture, enabling quick and easy incorporation of new features.

A complement to Prahalad's work is the work being done by a consortium of U.S. universities, institutions, and industries which seek to understand how BoP theory fits into the larger context of sustainability, especially environmental sustainability. The consortium takes the contrarian's view that business—more than either government or civil society—is uniquely equipped, at this point in history, to lead us to a sustainable world. Figure 18.9 illustrates the approach called "The Base of the Pyramid Protocol" to meet the vision of creating inclusive, mutually beneficial business processes through which the private sector and local communities build economic, social and environmental value (Hart, 2005).

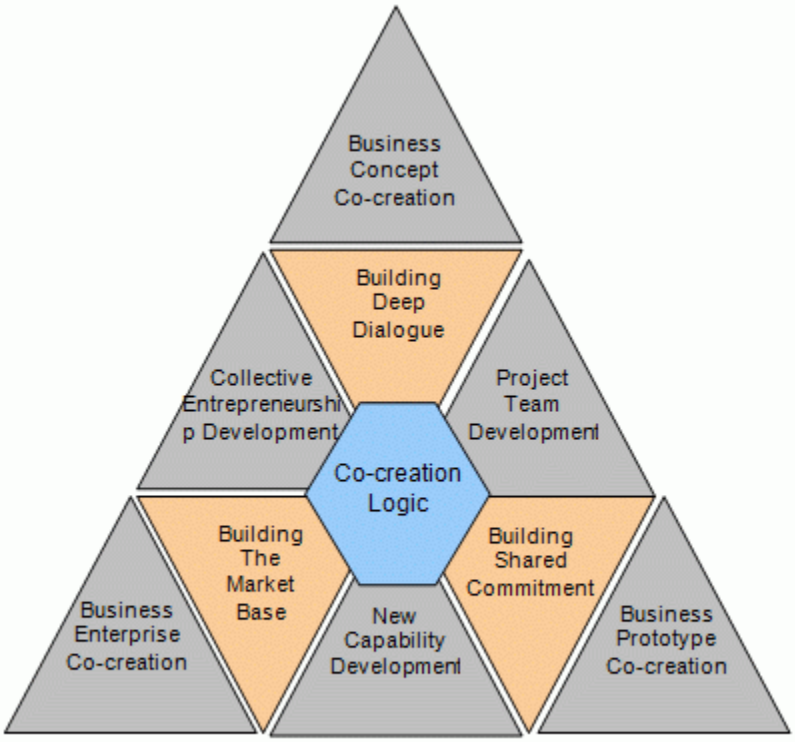


Figure 18.9 The Base of the Pyramid Protocol (Hart, 2005).

Theories of Entrepreneurship

Back to top

It is generally recognized that entrepreneurship revolves around the recognition of opportunities and the pursuit of those opportunities (Venkataraman, 1997). "An entrepreneurial opportunity consists of a set of ideas, beliefs and actions that enable the creation of future goods and services in the absence of current markets for them (Sarasvathy et al., 2003)." Entrepreneurial opportunities can be classified into three types: opportunity recognition, opportunity discovery and opportunity creation.

On the other hand, there is no consensus yet on questions such as the following: Where do new opportunities come from? Why do some people start firms? The answers have varied depending upon whether one is looking at the questions from the perspective of entrepreneurship or of firm innovation.

Entrepreneurial opportunities are generally viewed as exogenous while firm formation is taken to be endogenous to characteristics specific to the individual involved. By contrast, theories on firm formation have generally assumed the firm to be exogenous, while opportunities are taken to be endogenously created through investments in R&D and human capital. In other words, this view hinges on a knowledge production function such as:

$$I = a(RD)_i^b(HK)_i^b\varepsilon_i \quad (18.1)$$

where I represents the degree of innovative activity, (RD) represents R&D inputs, (HK) represents human capital inputs, and i represents the unit of observation which can be set at the

level a country, industry or enterprise.

The problem is that traditional views on firm formation do not explain the empirically found observation that much of incremental innovations in practice have come from incumbent firms with strong records of investment in R&D and human capital, whereas many of the radical innovations have come from small scale industries and startups. In innovation literature this observation has come to be known as the *innovation paradox*. In recent years, a new endogenous theory called *Knowledge Spillover* has been developed to resolve this paradox (Audretsch & Keilbach, 2005, 2006).

Contrary to the somewhat popular view that entrepreneurs (recognizers, discoverers, or creators of opportunities) are born, the knowledge spillover theory assumes that they appear in response to knowledge creation irrespective of where it has occurred. Thus, in this view, the spillover of knowledge is virtually synonymous to the creation of a new, knowledge-based firm. Amongst other responses, additional entrepreneurial activity is an important response to the creation of new knowledge. An implication of the theory is that entrepreneurship has a potentially higher role in knowledge intensive industries. This partly explains the resurgence of entrepreneurialism following the appearance of the IT industry. "By serving as a conduit for knowledge spillovers, entrepreneurship is the missing link between investments in new knowledge and economic growth (Audretsch & Keilbach, 2006)."

The endogenous theory also explains the following 'stylized facts" taken from the North American context:

~ Growth rates are higher for smaller enterprises.
~ Growth rates are higher for younger enterprises.
~ Growth rates are even higher for small and young enterprises in knowledge intensive industries.
~ The likelihood of survival is lower for smaller enterprises.
~ The likelihood of survival is lower for younger enterprises.
~ The likelihood of survival is even lower for small and young enterprises in knowledge-intensive industries.

Finally, consider the question how an entrepreneur is likely to act on the perceived opportunities arising from knowledge spillover or other sources. There can be many reasons for pursuing an entrepreneurial opportunity over staying idle (if you have a rich father) or a professional career. We will consider here only the latter case since it is the more common scenario. In such a scenario, the choice is made by comparing the wage the individual expects to earn through employment, W^*, with the profits that are expected to accrue from a startup, P^*. Thus, the probability of starting a new firm, Pr(s), can be represented as a function of the excess of P^* over W^*:

$$\Pr(s) = f(P^* - W^*) \quad (18.2)$$

National Entrepreneurial Development

Back to top

We have already noted that there are substantial variations in the intensity and mix of entrepreneurial activity across nations. These variations arise essentially from the culture of the nation and the socioeconomic policies in effect. For instance, in socialistic countries which

emphasize collective interests over individual interests, entrepreneurship is, in principle, taboo. Likewise, totalitarian regimes do not welcome entrepreneurship. In general, entrepreneurship has a chance of flourishing in democratic regimes where individualism is valued and market forces are respected.

Surveys on entrepreneurship conducted by the World Bank (WB, 2009) have identified significant relationships between entrepreneurial activity and indicators of economic and financial development and growth, the quality of the legal and regulatory environment, and governance. For instance, an interesting finding is that for every 10 percentage point decrease in entry costs, business density and the entry rate increase by about 1 percentage point.

But entry costs constitute only one factor affecting the ease of doing business. Indeed, a host of other socio-regulatory features can strongly influence the potential for entrepreneurship in a nation. For instance, one reason for entrepreneurship flourishing better in the U.S. than in EU-countries is that it is easier to declare bankruptcy in the U.S. In Europe, there is a strong social stigma attached to bankruptcy. In contrast, in California, bankruptcy is almost celebrated because of the general acceptance of failure as an essential part of innovation. It is also much easier legally in the U.S. for declaring bankruptcy.

Here is the full list of the socioeconomic features identified by the World Bank:

~ *Starting a business*: procedures, time, cost and paid-in minimum capital to open a new business.
~ *Dealing with construction permits*: procedures, time and cost to obtain construction permits, inspections and utility connections.
~ *Employing workers*: difficulty of hiring index, rigidity of hours index, difficulty of firing index, firing cost.
~ *Registering property*: procedures, time and cost to transfer commercial real estate.
~ *Getting credit*: strength of legal rights index, depth of credit information index.
~ *Protecting investors*: strength of investor protection index, extent of disclosure index, extent of director liability index, and ease of shareholder suits index.
~ *Paying taxes*: number of tax payments, time to prepare and file tax returns and to pay taxes, total taxes as a share of profit before all taxes borne.
~ *Trading across borders*: documents, time and cost to export and import.
~ *Enforcing contracts*: procedures, time and cost to resolve a commercial dispute.
~ *Closing a business*: recovery rate in bankruptcy.

For each of the 181 economies examined, the bank calculated the index for ease of doing business as the simple average of the economy's percentile rankings on each of the above 10 topics. Figure 18.10 shows the observed relationship between ease of doing business and entry rate. Note that entry rate increases as the ease of doing business improves. Thus, New Zealand which has the highest density of new business per capita (27%) ranks number one in terms of ease of doing business. Likewise, Haiti which has the lowest entry rate density (1%) also performs very poorly in terms of entry rate (176 out of 181 countries).

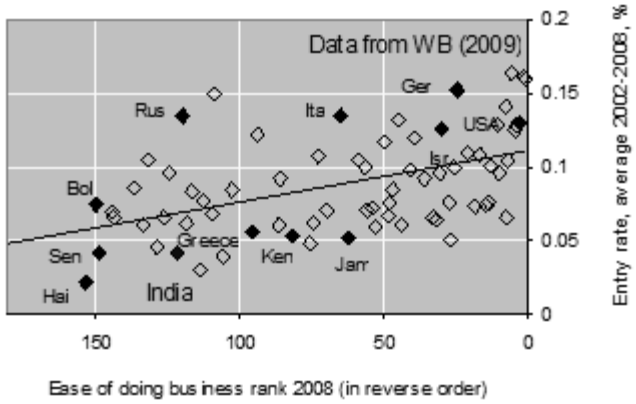


Figure 18.10 The impact of easeof doing business on new business.

Consider now the perspective from GEM. As already noted, one finding of GEM is that the contribution of entrepreneurship to national economy depends on the prevailing types of entrepreneurship (see Figure 18.11). Evasive entrepreneurship actually impedes growth, necessity entrepreneurship contributes little, opportunity-based productive entrepreneurship contributes positively, and high-expectancy entrepreneurship provides the greatest benefits to the society in terms of economic growth and job creation. Hence nations should strive to curb evasive entrepreneurial activities by enforcing proper laws while trying to maximize entrepreneurial activities of the high-expectancy type through a proactive implementation of national policies. In this section we will examine the general nature of these policies.

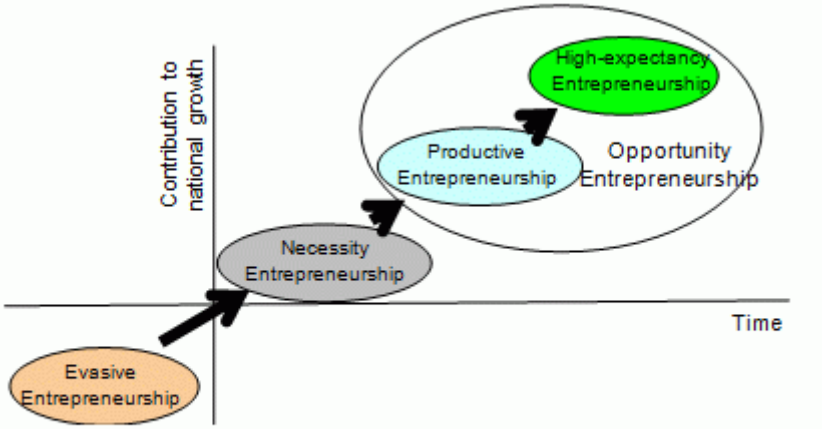


Figure 18.11 National entrepreneurial development (GEM, 2005a).

Figure 18.12 shows a model developed by GEM (2005a) to help formulate national policies promoting entrepreneurship. The model starts with the general observation that the intensity and type(s) of entrepreneurship in a nation depends upon its social, cultural and political context. This context determines the general and entrepreneurial framework conditions prevailing.

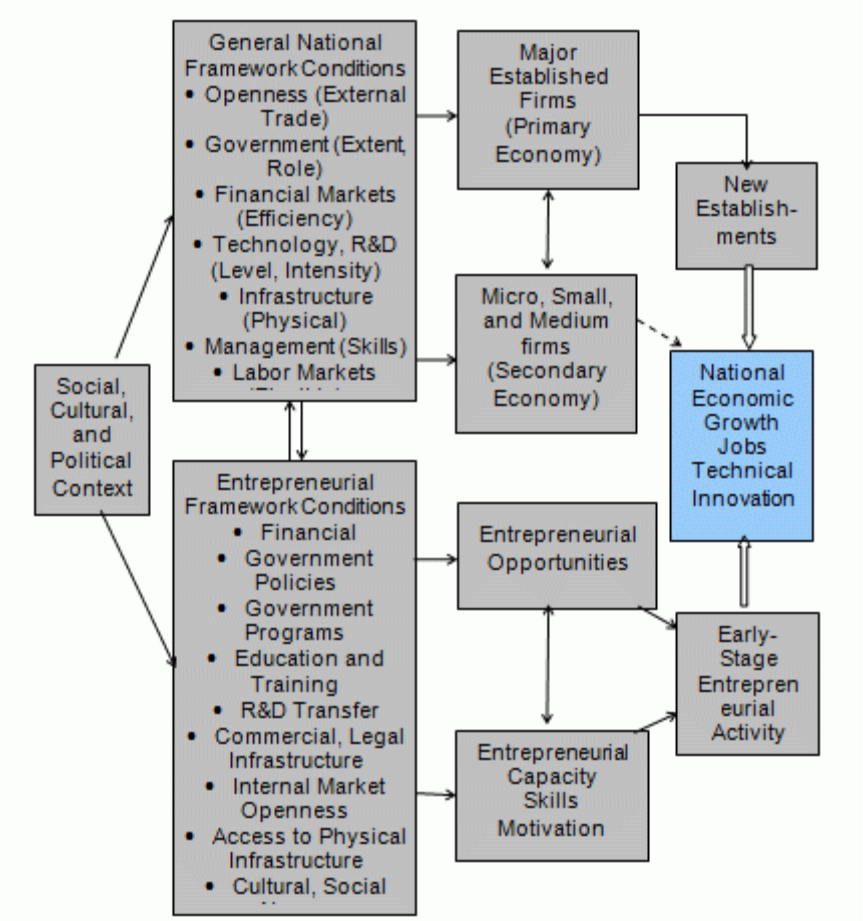


Figure 18.12 GEM framework for entrepreneurship development (GEM, 2007).

The general framework conditions such as openness to external trade, the extent and role of government, the efficiency of financial markets, the level and intensity of R&D and technology use, the skills of managers, the flexibility of the labor market and the degree to which rule of law prevails in the society have profound influence on the primary (major establishments) as well as the secondary economy (micro, small and medium-sized establishments). These conditions however, by themselves, lead to entrepreneurial activity or *business churning* through the creation of totally new firms. The degree of business churning depends on the entrepreneurial opportunities available and the capacity (skills and motivation) of the aspiring entrepreneurs in exploiting the opportunities available.

The general framework conditions do not directly affect entrepreneurship, rather it happens through their influence on the 'entrepreneurial framework conditions': the policies and programs of the government, the level of education in the nation, the facility with which R&D results can be transferred to the industry, the commercial and legal infrastructure, market openness, and the like. These conditions vary from country to country. So should the national policies pursued

Government Policies

Government regulations and policies towards individual or corporate entrepreneurship can direct people's activities towards productive purposes or otherwise. "If the rules are such as to impede

the earning of much wealth via activity A, or are such as to impose social disgrace on those who engage in it, then other things being equal, entrepreneur's efforts will tend to be channeled to other activities call them B. But if B contributes less to production or welfare than A the consequences for society may be considerable (Baumol, 1990)." Thus, in general, it is not the lack of entrepreneurship that is the problem, but rather the institutional context directing entrepreneurial activities toward perverse ends. In particular, one needs to distinguish between productive entrepreneurs whose activities result in economic growth and unproductive entrepreneurs whose activities can result in economic stagnation or retrogression.

A major finding of GEM (2002) is that, in developing countries in particular, necessity entrepreneurs are contributing to national economic growth in a substantial way. Necessity entrepreneurs mainly rely on informal funding sources. The use of informal sources is some ten to twenty times that of formal venture capital which is directed more towards R&D-based opportunity entrepreneurship. Yet the bulk of government attention in developing countries seems to be directed towards venture capital support. There is a need to correct this tendency by tracking the informal, personal financial flows and develop programs for encouraging such flows—for example, through appropriate tax incentives. There is also a need to strengthen educational programs for necessity entrepreneurs.

One way to promote necessity entrepreneurship among very poor people is to follow the example of 'Micro-credit' set by Muhammad Yunus. Poor people across the world tend to be mostly illiterate, and invariably get low paying jobs. That's why they remain poor throughout. The main problem with lending money to such people is that they have no collateral to offer and have no credit history.

Consider now what governments in general can do to promote opportunity entrepreneurship. Here are some suggestions from GEM (2005a):

~ "Peace and stability are necessary conditions for the development of an entrepreneurial society." The principal role of government with regard to entrepreneurship therefore lies in providing political and macroeconomic stability needed for entrepreneurship.

~ "In all countries, governments need to remove barriers to competition, review the provision of services with respect to efficiency and effectiveness, promote fiscal responsibility, and ensure transparency of the law and a clear legal framework for property rights and regulatory oversights."

~ "In the global economy, a policy agenda for promoting entrepreneurship must focus on the progressive liberalization of global markets. Since entrepreneurship is typically at the cutting-edge of new market development and technological innovation, trade restrictions tend to penalize entrepreneurs more than other groups."

Finally, remember that one size does not fit all. In order to be effective, entrepreneurship programs must be adapted and tailored to prevailing national circumstances.

Now let us turn to high-expectation entrepreneurship which, as many studies show is different from more traditional types of entrepreneurship (GEM, 2005b). For instance, unlike low-expectation entrepreneurial activity, high-expectation entrepreneurship appears to be negatively associated with national entrepreneurial framework conditions. High-expectation entrepreneurial activity tends to be either positively or neutrally associated with national entrepreneurial framework conditions. What is more important for high-expectation entrepreneurial activity is how conducive are the national framework conditions. Intriguingly, lower overall levels of

entrepreneurial activity seem to be associated with higher levels of high-expectancy entrepreneurship.

All this seems to suggest that whether high-expectancy entrepreneurship flourishes in a nation depends even more on government policies and programs. Therefore the challenge for low-income countries is to improve the overall infrastructure for business and increase the supply of high quality jobs, rather than increase the overall level of entrepreneurial activity. Improving the elementary and secondary education provision in low-income countries will reduce the dependency on necessity entrepreneurship that characterizes those without education. As the overall education level rises and the supply of high-quality jobs increases, necessity-driven entrepreneurial activity is likely to fall, and entrepreneurial activity may shift toward high-expectation activity.

As for high-income countries, GEM (2005b) has made some specific recommendations:

~ Address the anatomy of entrepreneurial activity, rather than the overall level of entrepreneurial activity. Address the economic tradeoffs related to the entrepreneurial career choice, particularly among those who are well educated with a reasonably high income. The education systems in many European and highly developed Asian countries currently emphasize teaching young people to become good employees rather than on promoting the kind of values likely to lead to an entrepreneurial spirit, such as self-sufficiency, autonomy and personal initiative. The countries are likely to benefit from a more entrepreneurial culture and greater respect for successful high-growth entrepreneurs in society.

~ Facilitate spinoffs from knowledge-intensive and/or research organizations belonging to both private and public sectors.

~ High income countries with small domestic markets (e.g., Hong Kong, and Singapore) should internationalize the activities of their high-growth entrepreneurial ventures at an early stage in the respective lifecycles.

~ Address and remove disincentives for entrepreneurial growth. For instance, if improperly introduced, greater compliance requirements as a function of organizational size may deter some entrepreneurial companies from bypassing a certain threshold size. Similarly, as they have less slack resources to use as a buffer during periods of weak demand, small entrepreneurial ventures have a greater need for flexible employment relationships. The last point is particularly pertinent in many European countries where it can be difficult and time consuming to terminate employment relationships.

In addition to implementing the policies described in the previous section, nations can also establish certain physical facilities to help startups take off in their ventures quicker than they would otherwise and to promote business entrepreneurship in general. Depending on their magnitude these facilities can be broadly classified into four types: Business Incubators, Industrial Parks/Estates, Science/Technology Parks, and Special Economic Zones (SEZ).

Industrial Parks or Estates

An industrial park (or industrial estate in British English) is an area of land set aside for industrial development (Wiki). Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. A more “lightweight” version is the office park, which has offices and light industry, rather than heavy industry.

The idea is to attract industries and multi-nationals by reducing their prebusiness expenses

through the provision of dedicated infrastructure in a delimited area. Depending on the size of the park, the infrastructure may include roadways, railroad sidings, ports, high-power electric supplies, communications cables, large-volume water supplies, and high-volume gas lines, and so forth. Often, the intention is to separate industrial and urban areas so as to reduce environmental impact.

During the 1970s to 1990s, there was a glut of industrial park development in the United States as well as many other parts of the world. However, experience with the parks has been mixed. While a few have succeeded, many are now sitting idle with the sites having become unsuited for other uses. One reason for this is their remoteness from urban areas which resulted in unacceptable levels of commuting from urban areas. The second reason is that the infrastructure and park layout had been decided before any industries had moved in. The units were all identical in layout, so they couldn't meet the specific needs of any of the industries. So, in many cases, the initial hope that once the infrastructure is built "they" would come were dashed. In some cases there was also negative societal reaction: valuable agricultural land had been laid waste, the benefits weren't reaching the poor, and the like.

Business Incubators

A far more successful concept has been that of business incubators. Just as in the case of an artificial incubator for hatching eggs to produce live chicken, a *business incubator* aims to nurture young firms by helping them to survive and grow during the startup period when they are most vulnerable. The idea is to improve the opportunities for the success of entrepreneurial firms and accelerate their time to market. The incubation process is intended to last around 2–5 years. The term 'incubator' arises from the 'chick-hatching' metaphor. Typically, the relationship between the business incubator and an incubate passes through the following six stages (i) preparation for startup (ii) the incubation process, (iii) measuring the performance of the incubatee; (iv) formulating exit policies, (v) providing 'parental' care, and (vi) disconnecting the incubatee (Wong, Cheung, & Venuvinod, 2005).

The incubator itself is a model of a sustainable, efficient business operation. Only entrepreneurs with feasible projects are admitted into the incubators. Both startup firms that are at pre-incubation level and medium-sized enterprises that may require extra scope to develop a new concept may be admitted. The incubatees are offered shared office services, access to equipment, flexible leases and expandable space and a specialized menu of support resources and services such as hands-on management assistance, and access to financing. Quite often these are provided at discounted rates. By housing multiple tenants, the incubator reduces the individual cost to tenants of acquiring support services. Incubators are designed for flexibility and supply space which can easily be adapted to meet the needs of many types of operations.

Incubators support much of their operational costs by revenue generated from rents collected from tenants. Other sources of revenue include: subsidies, project-specific grants, royalty and equity income, service fees, misc. income, training & seminar fees. Although the success rate varies among programs, it is not rare to find about 80 per cent of businesses incubated continuing to do business after five years, compared with only 33 per cent that do not have such support.

Business incubation was started in the U.S. in the late 1950s. The first documented incubator was the Batavia Industrial Centre, which opened in 1959 in Batavia, New York, in an old farm implement manufacturing plant. The idea got a boost in 1964 when a 28-member consortium of colleges, universities and academic health centers opened the University City Science Centre in

Philadelphia, Pennsylvania. After some initial hiccups the movement gained rapid ground during the 1980s. In the mid-1990s incubators began nurturing companies that generated astounding results in terms of job creation, capital investment and economic wealth to their communities. As a result, by 1996, there already were some 600 business incubators in North America, which added more than 19,000 companies and more than 245,000 jobs to the economy. Inspired by these successes, communities around the world started embracing business incubation as a viable approach for stimulating, diversifying or even stabilizing local economies.

Business incubators can be private or public. Private incubators are for-profit firms that take equity or receive a fee for the business services they provide to their clients. In the last twenty years, many developed and developing countries have started large systems of public business incubators to encourage and assist entrepreneurship. Some incubation programs are targeted towards general businesses, others towards high-tech and science-based ventures. When the latter is the case, effective collaboration with universities and research institutions is essential to motivate researchers into taking the risk of initiating a company. However, since new firms require finances to grow, incubators also partner with investors, venture capitalists, business angels, banks, and the like. In many countries, business incubators have national associations to represent their interests and organize meetings where best practices are disseminated.

Business incubators can be private or public. Private incubators are for-profit firms that take equity or receive a fee for the business services they provide to their clients. In the last twenty years, many developed and developing countries have started large systems of public business incubators to encourage and assist entrepreneurship. Some incubation programs are targeted towards general businesses, others towards high-tech and science-based ventures. When the latter is the case, effective collaboration with universities and research institutions is essential to motivate researchers into taking the risk of initiating a company. However, since new firms require finances to grow, incubators also partner with investors, venture capitalists, business angels, banks, and the like. In many countries, business incubators have national associations to represent their interests and organize meetings where best practices are disseminated.

Science/Technology Parks

The concept of a science park combines the concepts of industrial park and business incubator. According to the International Association of Science Parks (IASP), a *science park* is an organization, managed by specialized professionals, whose main aim is to increase the wealth of its community by promoting a culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. Usually, the emphasis is on high-growth, technology-based businesses. Among the facilities provided are infrastructure and support services including collaborative links with economic development agencies; formal and operational links with centers of excellence such as universities, higher education institutes and research establishments; management support actively engaged in the transfer of technology and business skills to small and medium-sized enterprises. While most science parks have a specific physical location some are partially or totally cybernetic.

A majority of the currently existing science & technology parks in the world were created during the 1990s (Figure 18.13a). Some 20% of them are big (>1,000,000 m^2) although many (51%) are small (<200,000 m^2). Almost 70% of the "Parks" share services with their university. Figure 18.13b shows the overall proportions of different types firms operating within U.S. science parks.

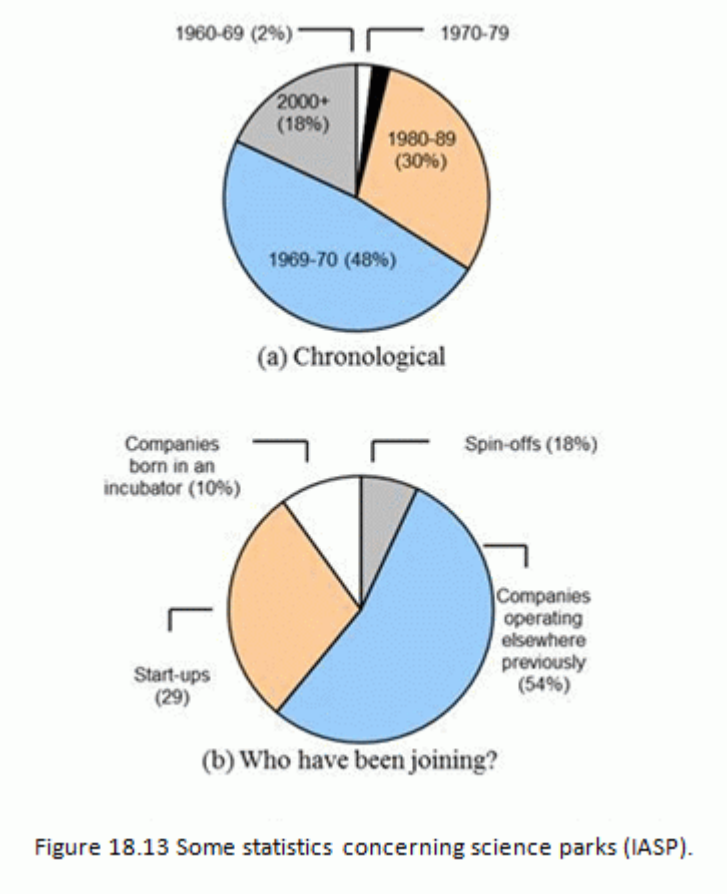


Figure 18.13 Some statistics concerning science parks (IASP).

Special Economic Zones

A *special economic zone* (SEZ) is a geographical region that has economic laws that are more liberal than a country's typical economic laws. Being a geographic region than a building, estate or 'park', an SEZ is several orders larger than a business incubator, an industrial estate, or science park.

SEZ are characterized by some common features:

~ Duty-free imports of capital goods and inputs for production for export

~ Liberal access to foreign exchange

~ Encouragement of FDI

~ Simplified, "one-stop" approvals

~ Generous tax concessions, especially in early years

~ Flexible labor laws

~ Limitations on sales within the country

~ Better infrastructure (power, transport & communications)

The benefits sought include faster economic growth, employment generation on a large scale, earning more foreign exchange, infusion of modern technologies & their demonstration and spread effects, and economies in production due to clustering.

Of course, such benefits can be there for the whole country if the same policies are adopted

everywhere. However, there often are economic, political, social reasons for restricting such policies to certain places. Thus the formation of SEZ is the second-best option to generalized liberalization. Today SEZ are operating in over 120 countries while accounting for over $600 billion in exports and 50 million direct jobs.

The concept of SEZ however is not exactly new. Ancient Harappan and Roman civilizations had set aside small fenced-in areas specializing in manufacturing for exports. The modern times saw the development of special free ports such as Aden, Singapore and Hong Kong, and export zones such as Puerto Rico (U.S.), Shannon International Airport (Ireland) and Kandla (India).

The People's Republic of China entered the SEZ scene in a big way in 1978 as a part of its concerted drive to quadruple national GDP within twenty years. This goal was sought to be achieved through "Four Modernizations", one of which included the formation of Economic & Technology development Zones (ETDZ) and SEZ. As Deng Xiaoping, the 'Father' of contemporary China, declared the idea was "not to constrain but release." Almost immediately, three SEZ were started in Guangdong province in Southern China and one in Xiamen. Soon, the SEZ became testing grounds for market-based export-led growth strategies. While the government provided the heavy infrastructure needed each zone could introduce more liberalized regulations concerning foreign investment, tax concessions, customs regulations, labor and contract and the like. Once the new market-based strategy was found to be successful, more SEZ were formed in coastal areas, e.g., Pearl River Delta (PRD), the Yangtze River Delta around Shanghai, Minum Delta around Xiamen, and Hainan Island.

India too joined the SEZ bandwagon with some gusto in 2000. In addition to conventional sops, firms in the new SEZ were allowed full repatriation of profits; 100% FDI investment for manufacturing; freedom for sub-contracting; 100% income tax exemption for five years; and exemptions from Central Excise Duty on capital goods, raw materials and consumable spare parts purchased from domestic market.

An interesting feature of India's recent SEZ policies is the significant deviation from the tradition of having them built and maintained by the public sector (as in China, Dubai, etc.). The traditional policy has often been criticized for having attracted investment only by offering distortionary incentives rather than building underlying competitive conditions. Critics have also argued that these incentives create a fiscal burden on the taxpayer and hurt environmental and labor standards. The recent Indian policy however sidesteps these criticisms by empowering the private sector to build and even run several high-profile Indian SEZ. The hope is that the private sector would be able to respond better to market forces thus ensuring the economic sustainability and competitiveness of the SEZ.

The potential implications of this dramatic policy change are obviously enormous especially when we note that some of these SEZ-complexes will become large cities in time, with populations running into millions. Debate is continuing in India about whether the new policy is creating a new generation of feudal barons, what will happen to the civil and democratic rights of the "citizens" in the privatized SEZ, whether the private proprietors can be trusted to provide adequate environmental safeguards, and to what extent people outside the SEZ might or might not be benefited.

The Impact of Globalization

Consider now the impact of globalization on entrepreneurship. Let us look at the empirical evidence first. We will use the KOF globalization index described in Chapter 7 as a measure of

the degree of globalization at the national level (KOF, 2007). Figure 18.14a shows the correlation between the globalization index and total entrepreneurial activity (TEA) over a range of nations. Note that the relationship is weak suggesting that TEA is influenced by a host of factors other than globalization. The relationship is negative reflecting the fact that globalization improves normal employment opportunities through the formation of subsidiaries of MNC, etc.

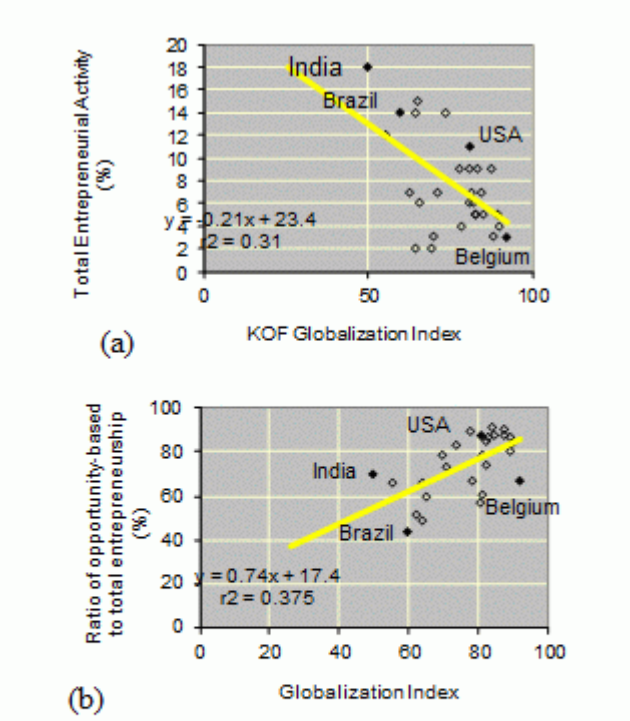


Figure 18.14 The impact of globalization on entrepreneurship, globalization data: (KOF, 2007), entrepreneurship data: (GEM, 2002).

Figure 18.14b shows the impact of globalization on the proportion of TEA arising from opportunity-based entrepreneurship. Again the correlation is weak but, this time, the relationship is positive. This suggests that increased globalization leads to increased opportunities for entrepreneurship, although the necessity to engage in entrepreneurship is decreased.

###

Contents of Parts I and II

Back to top

Part I My World, My Nation

Goal 3: Minimize Inequality

Chapter 8 National Culture
What is Culture?
National Cultures
Occupational Cultures

Part II My Firm

Chapter 9 The Diffusion and Dynamics of Innovation
Theoretical Origins
Technology-Adoption S-curves
Industry Dynamics

Chapter 10 Industry Development
What is an Industry?
Why do firms exist?
Stages of Industrial Development
National Competitive Advantage: Porter's Diamond

Chapter 11 Competition: The Driver of Innovation
What is Competition?
Types of Competition
Market Structure and Pricing

Chapter 12 Competitive Forces
Porter's Five Competitive Forces
The New competitive Forces
The World is Getting Flatter

Chapter 13 Competitive Advantage and Positioning

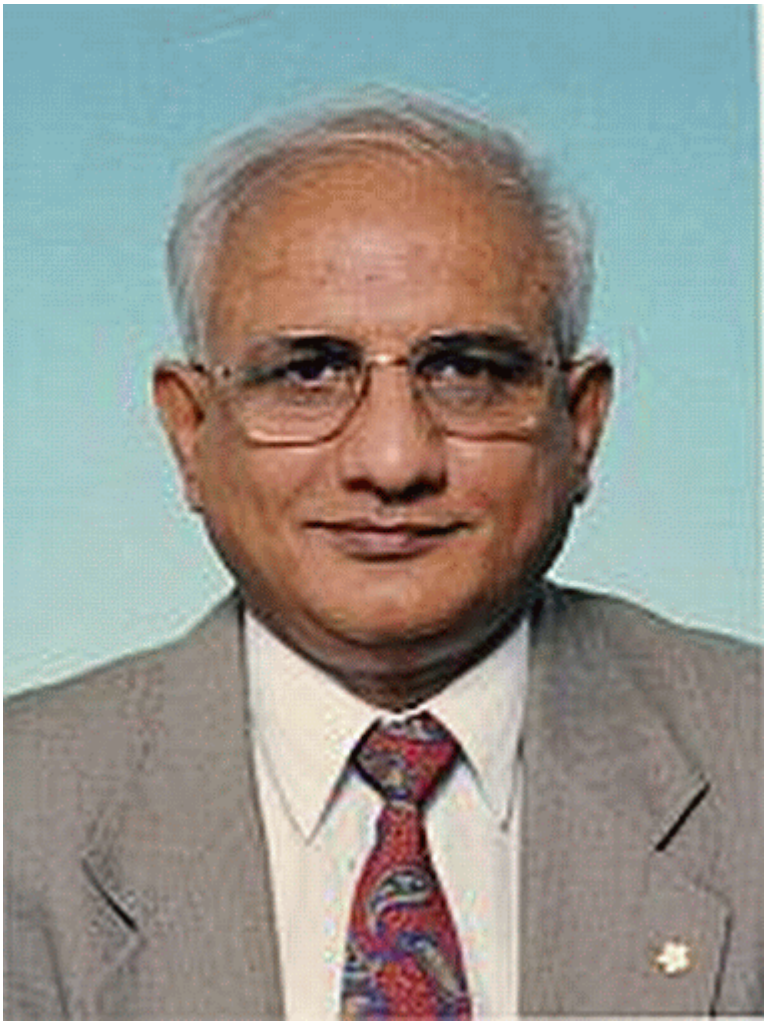
Competitive Scope
Competitive Advantage
Porter's Generic Competitive Strategies
Competitive Positioning

Chapter 14 Strategy Development and Mapping
What is Strategic Management?
Five Ps for Strategy
Dominant Schools of Strategy Development
Balanced Scorecard Strategy Maps

Chapter 15 Research and Development
A Linear Model of Research
The Importance of Basic Research
A Two-dimensional Model of Research
National Research Infrastructure
Changing Modes of Knowledge Production
The Rise of the Entrepreneurial University
Evaluating Public R&D
National R&D Output Comparisons

~~~

About the Author

Back to top

Patri, K. Venuvinod is a technology-academic with extensive international experience. Educated at College of Engineering, Osmania University, Hyderabad, and Indian Institute of Technology, Bombay, Venuvinod has a PhD from University of Manchester Institute and Science and Technology (UMIST), U.K. Subsequently, he was elected as a Fellow of CIRP, Institution of Electrical Engineers (UK), and Hong Kong Institution of Engineers; and Senior Member of Institute of Industrial Engineers.

Venuvinod's 37-year teaching career included long stints at Regional Engineering College, Warangal, India; Hong Kong Polytechnic; and City University of Hong Kong. At the last institute, he was the founding Head of the Department of Manufacturing Engineering and Engineering Management. He also became the university's Chair Professor of Manufacturing Engineering. During his 25-year stay in Hong Kong, he frequently visited mainland China to collaborate on several projects.

Venuvinod retired from active service in 2002. However, he continues to be associated with City University of Hong Kong as an Emeritus Professor. In 2004, he co-authored a book on rapid prototyping (published by Kluwer Academic Publishers). In 2001, he started the International Organization for Developing Universities (IODevUni) which engaged over 22 engineering colleges in Hyderabad, India, in a range of activities promoting the growth of technology, innovation and entrepreneurship (TIE).

In 2010, Venuvinod set up tecinnovent.com to act as an international forum for discussing TIE-related issues. There are many ways you can participate. You may comment on TIE-related books including the present trilogy or offer teaching support material (e.g., local case studies). You may recount your entrepreneurial experiences. Or, you can initiate discussions concerning
~~~

the promotion of TIE in your region and workplace. It is all up to you.



~~~

Connect Online with the Author

Back to top

tecinnovent.com
(An international forum promoting TIE)

Twitter
Facebook
Linkedin
~~~

Smashwords