

**The Science and Practice of New Business Ventures: Wealth Creation and  
Prosperity through Entrepreneurship Growth and Renewal**

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The Science of New Ventures: Combining Theory and Practice for  
Wealth and Job Creation through Entrepreneurship

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**Abstract**

This paper concentrates on the theory and practice of innovation and entrepreneurship. Indeed, the lessons of history relate to the importance of understanding the importance combining the two. When the two are combined, we can begin to talk seriously about the science of entrepreneurship. Like the Agriculture Agent, we must continually strive to create the knowledge within the academies and translate that knowledge into wealth and jobs. The first part of the paper is a quick overview of the historical data on innovation and entrepreneurship, concentrating on theories as late as the 1800s and as early as 2000 B.C. We then turn to the “do” spirit or the importance of practice, which has recently developed with school of business in the area of entrepreneurship. The Austin Model is used to enhance our discussion of combining practice with theory so that structures of entrepreneurial enhancement can continually developed and re-invented. Business Schools, like all professional schools, should concentrate on the sifting of best practices to advance practice. In this case, it is the practice of entrepreneurship. Business Schools can no longer afford to simply do case studies, but must combine research with practice in order to create regional and global wealth jobs and prosperity.

**Introduction**

It is indeed a pleasure to address this body of the United States Association of Small Business and Entrepreneurship. I consider it an honor to present the keynote speech this year. The creation of new business organizations for economic prosperity is one of the oldest activities of people throughout history. The study of this process, which has been called entrepreneurship, has occupied the minds of scholars for centuries. The economic arrangement that enhances entrepreneurship, capitalism, has had to fight its way through competitive types of economic arrangements throughout history. The

decline of the Soviet Union, and the intense interest in market economies, has made the demand for knowledge about the entrepreneurial process great. Although there are different kinds of market economies, new venture creation must stand at the center of all. As an IC<sup>2</sup> Fellow, I have traveled the globe and have seen communities strived to create wealth and jobs. Thus demand to move from theory of entrepreneurship to the “doing” of entrepreneurship is intense throughout the globe and at home.

Historically, theorizing about entrepreneurship has been done across many different disciplines, including history, engineering, anthropology, economics, sociology and psychology. In the last three decades or so, Business Schools have taken center stage in the academy for the study of entrepreneurship. Chaired professors and entrepreneurial centers are indicators of the commitment of business schools around the country and world. The same thing is happening in the disciplines that make up colleges of Engineering and Natural Sciences. Despite all of the historical scholarship developed by scholars, we do not have a “science of entrepreneurship.” The question is whether or not what we call the study of entrepreneurship across all disciplines, can be carved into the science of entrepreneurship? The purpose of this paper is to share with you my ideas on the science of new ventures; ideas that I hope will further advance the academic study of this discipline as well as the “do” or practice part of entrepreneurial education.

In order to achieve our purpose, the first section concentrates on the historical and theoretical knowledge that has been generated around the field of new venture development. In this section we also pay attention to the nature of science and disciplines that have been engaged in creating measurable, theoretical models of entrepreneurship. The second section concentrates on how the entrepreneurial process, or what I call the

“do” or practice of entrepreneurship, is integrated with the theoretical model that disciplines have created. We do this by concentrating on what we call the Austin Model.

### **Historical Data and the Science of Entrepreneurship**

Science has been defined as a systematic procedure for explaining phenomena that is empirical in nature. Of course empirical simply means things that one can observe and measure. Phenomena are events, occurrences that appear in patterns in nature, processes, events, and groups of people, behaviors, beliefs, opinions, emotions, feelings and thoughts. The purpose of the science of something is to explain the something; this explanation is based on a set of interrelated statements that produce a theory. A theory sets out to provide an understanding about a phenomenon, paying special attention to the conditions under which it occurs and when this is done, prediction is possible.

To be sure, the academic literature has developed a strong tradition of scholarship observing the phenomenon of “entrepreneurship” and creating propositions. Can we pull from this massive literature information that can contribute to the development of a science of entrepreneurship, with practical implications for professional schools? It is important to note that this early literature does not have a “do” component for entrepreneurship. This literature can be divided into two parts. The first is concerned with the development of the ideas that had an influence on the development of market societies that depend on entrepreneurship, including the contributions of “economic theory”, which was more concerned with developing a theory of economics than about accounting for entrepreneurship. The second is devoted to describing historical societies that developed strong economies based on new ventures. Although these traditions

overlap, they stand as separate contributions to the literature. Understanding these traditions moves us toward what I call the science of new ventures.

One strain of early scholarly attempts simply to determine the social structures which produced people who started new ventures. Writing in the late 1800s, the German scholar and sociologist Georg Simmel (Wolf, 1950) was fascinated by the introduction of entrepreneurial behavior into hunting and gathering societies. What fascinated him was the fact that the entrepreneurs, or those who introduced market economies to these societies and developed innovations in marketing, product development and what we now call technology transfer, were never from local communities where they found themselves. Simmel did not refer to these early people as entrepreneurs but rather simply called them strangers. Scholars who write in the tradition of Simmel argue that these “strangers” came at a time when subsistence agriculture and home crafts were in decline and represented the city, cosmopolitan values, customs that were strange and a different way of life (Butler & Green, 1977, Hamilton, 1978, Bonancich and Model, 1980, Sjoberg, 1960). In the tradition of early scholarship in Europe, Simmel identified strangers as distinctive ethnic groups who occupied the position as business people because they were new to communities and could not find work in established jobs of the state. In addition, entrepreneurship, money lending, and commerce were not considered prestigious, and indeed looked down upon. It was the strangers, therefore, who were forced into this activity for economic stability. Simmel’s work produced scholarship on all continents that examined strangers and business activities in the “old world.” This literature includes Greeks in Singapore, the Coptive Christians in Egypt, Jews in Europe, Ibo in Africa and Nigeria, Scots in South Africa, Armenians and Greeks in the Balkans,

the Huguenots in France (who became our Puritans), the Quakers in England, and the Polish in Russia and Eastern Prussia. The theme of this research is the stranger as trader and the trader as stranger (Weber, 1930, Rinder, 1958; Hagen, 1962; Simon, 1983; Zinner, 1991; Hamilton, 1978).

From a theoretical point of view, this literature from the experiences of old-world merchants makes a structural contribution to the study of entrepreneurship, in the sense that it is socially embedded and emerges from the experiences of individuals and their group. As such the approach is strictly sociological. This is opposite of the psychological literature, which would emerge and concentrate on traits of individuals (Hornaday & Abound, 1971; McClelland, 1961; Borland, 1974). We can also add that this early research provided the theoretical reasoning for the strong tradition of studies on immigrant entrepreneurship in America (Light, I.H., 1972; Levenstein, 1995; Butler, 1991; Butler & Greene, 1997; Min., 1998, Pierce, 1947; Aldrich, 1990).

Max Weber acknowledge the importance of the stranger in the development of business activity, but argued that after the Reformation there was a change in the value structure of the society and entrepreneurship was embraced. In *The Protestant Ethic and the Spirit of Capitalism* (1930), he argued that the ideas developed by Protestants legitimated the process of business development and innovation. Put differently, he argued that capitalism in Europe received a critical stimulus from thinkers such as Calvin and Luther that allowed the continent to break away from guild traditionalism and the negative attitude toward strangers (Butler & Greene, 1997). Weber also introduced ideas of the boundedness and the maintenance of enforceable trust within social networks (Spencer, 1995; Butler & Greene, 1997). He argued that the first people to develop this

new economic approach were merchants who belonged to the Protestant sects. Their methods of hard work, or what is called the protestant work ethic, soon lost its original religious tone and became thoroughly secular (Swedberg, 2000). In his later work Weber turns from arguments about the origin of the spirit of entrepreneurship to how individuals respond to opportunities within the economy and questions of innovation and business creation. (Swedberg, 2000).

Weber's reasoning of placing religious variables at the center of his explanations created a new strain of work that reacted to his emphasis on the protestant religion. The greatest challenge came from Weber Sombart's 1911 book, *Jews and Modern Capitalism* (Sombart, 1951); this is a work which has been almost forgotten because Hitler order all copies or the original manuscript destroyed during his administration in Germany. The re-publication of the work in 1982 showed that Sombart augured that Weber analysis was historically inaccurate. He argued that it was Judaism, not the ideas of Protestantism, that influenced the outward form of modern capitalism and give it its inward spirit. After criticizing Weber's data, he notes that the economic development of England, for example, ran parallel with the influx of Jews, mostly of Spanish and Portuguese origin.

The intellectual arguments over the development of capitalism, which forms the framework for entrepreneurs, thus revolved around religious ideas. We might add that there is modern work that continues to connect the importance of religion to the entrepreneurial spirit (Kotkin, 1992; Berger, 1991). Early scholars like Simmel, Weber and Sombart tried to explain the emergence of entrepreneurial behavior within the development of the capitalist system. Their theoretical contribution is that the source for

understanding entrepreneurial behavior lay in the social structure of societies and the value structures that are produced by them (Butler & Greene, 1997).

One of the most interesting things about the historical data on the study of entrepreneurship is what the discipline of economics, or mainstream economics, has not done. Indeed, the economist William Baumol, in 1968, wrote an article which noted that the entrepreneur had almost disappeared from the study of economics, and the whole thing was something like a performance of *Hamlet* with the Danish prince missing (Swedberg, 2000; Baumol, 1968). Bruck Kirchoff's 1991 article, "Entrepreneurship's Contribution to Economics," urges economists to desert their major guiding idea, equilibrium theory, and search for a new macro-theory that incorporates entrepreneurship (1991).

What about the old issues of the definition of the entrepreneur? To be sure, the discipline of economics (although history, sociology and economics were sometimes hard to partition in early scholarship) contains thoughts and ideas about the importance of entrepreneurship before the discipline turned to what is called neo-classical economics, which emerged at the turn of the century. It is in this literature that we began to get the definition of the entrepreneurial concept. Richard Cantillon, a Frenchman writing in the early 1700s, conceptualized entrepreneurs as individuals willing to buy at a certain price and sell at a certain price. Another Frenchman, Jean-Baptiste Say, noted that entrepreneurship takes place when the factors of production are combined into an organism (cited in Swedberg, 2000). As noted by Swedberg in *Entrepreneurship: The Social Science View* (2000), British economists, starting with Adam Smith, did not make a distinction between the capitalist and the entrepreneur, thus blurring the two concepts.

This can be seen in the work of both Ricardo and Marx. On the other hand, the German Joahann Heinrich Von Thunen's work that appeared in the mid 1800s made a clean distinction between the capitalist and the new business venture. This was also true to the German scholar Han von Mangoldt, who also wrote in the mid 1800s. He noted that entrepreneurial profit could be operationalized as rent of ability.

Perhaps no scholar is quoted more in the recent literature on entrepreneurship than Joseph Schumpeter. It is important to understand, however, that Schumpeter was like other economist, interested mainly in creating an economic theory of capitalism. In the 1940s, however, he was involved in the Entrepreneurial History Research Center at Harvard University and wrote some of the best articles ever written on the nature of entrepreneurship (Swedberg , 2000). Here Schumpeter noted that the entrepreneur does not have to be a single individual but can also be an organization, either a political or economic one. He also asked for the creation of a comprehensive history of the phenomenon of entrepreneurship, with an emphasis on finance and type of entrepreneur. He also noted that a theory of entrepreneurship should be based on the actual data that entrepreneurs produce rather than the preconceived notions of economics. Thus Schumpeter argued that economic history and economic theory should be combined (Swedberg, 2000).

As noted earlier, Schumpeter's major concern is a theory of economics. For Schumpeter, this economic system is an evolutionary process held together by change and innovation. In point of fact, removal of change from this type of free enterprise system would destroy the system (1950). In Schumpeter's framework, the entrepreneur is the agent who introduces the innovations that creates change or cause the system to

adjust. This conclusion was reached by Schumpeter in his 1911 doctoral dissertation, *The Theory of Economic Development*, which starts out with the idea that the central problem of economics is not equilibrium but structural change. Entrepreneurs lead the means of production into new channels by buying them or their services, and then using them as he or she pleases (1961).

Although Schumpeter wrote on many topics, those of us who take him from the shelf of theoretical ideas introduce him as an economist who understood the importance of entrepreneurship; the importance of entrepreneurship within a general theory of our capitalism economy. Like a voice in the wilderness, he set out to show that a theory of economics has to include the entrepreneur. Set against the theoretical background of equilibrium theory, which can be seen in the writings of the “classical economists” from Ricardo, to Mill, to Marx and to Keynes, he finds a place for not only entrepreneurs, but also entrepreneurial profit. Perhaps Peter Drucker gives the best interpretation:

“Schumpeter’s *Economic Development* does what neither the classical economists nor Marx nor Keynes was able to do: It makes profit fulfill an economic function. In the economy of change and innovation, profit, in contrast to Marx and his theory, is not a *Mehrwert*, a “surplus value” stolen from the workers. On the contrary, it is the only source of jobs for workers and of labor income. The theory of economic development shows that no one except the innovator makes a genuine “profit”; and the innovator’s profit is always quite short-lived. But innovation in Schumpeter’s famous phrase is also “creative destruction.” It makes obsolete yesterday’s capital equipment and capital investment. The more an economy progresses, the more capital formation will it therefore need. Thus what the classical economist-or the accountant or the stock

exchange-considers “profit” is a genuine cost, the cost of staying in business, the cost of a future in which nothing is predictable except that today’s profitable business will become tomorrow’s white elephant. Thus, capital formation and productivity are needed to maintain the wealth-producing capacity of the economy and, above all, to maintain today’s jobs and to create tomorrow’s jobs (Drucker, 1986: 109-110). In a word, Schumpeter argued that innovation should be included within analysis of the system, rather than something that is foreign or outside of the economic system.

No other economic scholar has been showcased as much as Schumpeter in what we called entrepreneurial studies. Because his ideas are about a theory of economics, he augured that capitalism would destroy itself. But the destruction of capitalism, even if he were correct, does not mean the destruction of the entrepreneur. Understanding this point brings us closer to understanding the science of innovation and entrepreneurship.

### **Business Schools and the Entrepreneurial Phenomenon**

The last two decades saw a boom in interest in entrepreneurship because of structural changes that occurred in the world. International competition in key industries, and the movement of manufacturing away from mainland America, issued in hard economic times. Large enterprises that traditionally provided the core of jobs were struggling, and the future did not look pleasant. David Birch, in 1979, took notice of the developing “entrepreneurial economy” and published a work that concluded that “small enterprises” created about 66 percent of all new jobs in America, whereas “middle sized and large firms provided relatively few new jobs when all things are considered (Birch, 1979). In that same year *Inc.* Magazine occupied the newsstand and along with publications like *Business Week* and *Fortune*, enjoyed tremendous success. America was

in the process of rediscovering its entrepreneurial roots and would create wealth and jobs in certain regions that created new jobs, opportunities, and hope.

The tremendous growth of interest in entrepreneurship in the larger society saw a parallel interest in business schools. Unlike early theorizing on entrepreneurship that developed in social sciences, business schools became serious about the teaching entrepreneurial process and growth. The big question was how to integrate this practice into research traditions of Management, Accounting, Finance, and Management Science and Information Systems? Another related question was, and is, could business schools integrate the ideas on entrepreneurship that developed in the social sciences since the 1700? Put another way, can the theory of entrepreneurship be combined with the practice of entrepreneurship as we design courses for students in business schools as well as those in the overall academy?

These questions have become a matter of standard debate, and an interesting literature has evolved which tries to shed light on these issues. Perhaps the most systematic scholarly treatment of appears in a work edited by Richard Swedberg entitled *Entrepreneurship: The Social Science View* (Swedberg, 2000). As noted by Swedberg, the social sciences have played a minor role during the renewal period of entrepreneurship in America and the approach taken by business schools emphasized the practice rather than the theory. He then critiques Carlos Jarillo and Howard Stevenson's article, "A Paradigm of Entrepreneurship: Entrepreneurial Management," that appeared in *Strategic Management Journal* (1990). Jarillo and Stevenson argued that certainly all of the past theorizing on entrepreneurship that appear in the social sciences for centuries can help to explain the causes of entrepreneurship, or the "why?," and its effects (or the

“what?”), these sciences having nothing to contribute to the understanding of entrepreneurial behavior. They then point out that business schools should concentrate on what entrepreneurs do when they are entrepreneurial. Swedberg then points out that Jarrillo and Stevenson’s definition of entrepreneurship is tailored to the doing or how of entrepreneurship: “Entrepreneurship is a process by which individuals-either on their own or inside organizations-pursue opportunities without regard to the resources they currently control.” (Jarillo and Stevenson 1990: 23).

Given that Swedberg is a social scientist (sociology) from Sweden, where theory is more important than practice in most disciplines, he was not very happy with the Jarillo and Stevenson argument, and edited an entire volume to try and deal with their arguments. He notes that the massive literature on entrepreneurship in the “social sciences” over the centuries have looked at what entrepreneurs do (or the how) as well as the causes (why) and cumulative effects (what). While he agrees that business schools should concentrate on the “how,” he argued that they missed the important point when it comes to integrating theory and practice. But Swedberg does concede the fact that when the social sciences are compared, economics, as opposed to other disciplines, may not be useful. In his own words: “The fact is that much of what the social sciences have produced insofar as the economy is concerned, has been of a very abstract nature and out of touch with economic realities. This is particularly true of economic theory, while the empirically oriented social sciences-such as sociology, psychology, and economic history-are less prone to this. The non-economic social sciences also lack the kind of unitary theory that mainstream economics has (eg. Equilibrium theory), and thus makes it

easier for them to relate to the practical knowledge of business people (Swedberg, 2000: 9).

Over the last two decades or so business professors certainly have made their contributions to the theory and practice of entrepreneurship. Karl Vesper's 1997 review (Vesper, 1997) divided research into the psychology of entrepreneurship, the sociology of entrepreneurship, venture finance, and economic development through entrepreneurship. The Babson Research Conference has produced an impressive literature; works that bring research together (Sexton and Kasarda, 1992; Sexton and Smilor, 2000) serve to add continuity to the rapidly growing research area. This research is different from early efforts discussed above because of the emphasis on "doing." As noted by Amar Bhidé (2000), the distinctive feature of most of the research and class room teaching emphases in business schools is on entrepreneurial functions. There is a concentration on new product development, process, forms of organizations, the management of risk, and on the coordination of functions and inputs.

Despite the success of entrepreneurship within business schools, there is still the critical strain that faculty can bring to the table. A number of years ago a faculty member informed me that if students are interested in entrepreneurship, they should leave the business school and go do it, for there was nothing to teach them in the academy. As noted by Bhidé, some have argued that there is a sort of Heisenberg principle related to entrepreneurial acts; when reported in detail, the described act is no longer entrepreneurial. He further notes that literature has pointed out that the performance of new enterprises depends on things that cannot be studied and taught, and business scholars have argued that education in business administration was, at best, a minor

factor in successful start-up enterprises. He drills further in the literature and notes that a long time teacher of entrepreneurship argued, based on his data, that people who engage in entrepreneurship see no relationship between business education and their success. Instead, success was related to guts, timing, luck and determination (Bhidé, 200).

Despite the critical strain, the last two decades or so business scholars have developed outstanding teaching programs in entrepreneurship throughout the country. Ideas from core business disciplines have been integrated into the teaching literature of entrepreneurship. We also have to concentrate on practice; to take knowledge and know-how from the academy to the region.

### **The Austin Model and the Science of Entrepreneurship**

I remember the call from George Kozmetsky, former Dean of the Business School and founder of the IC<sup>2</sup> Institute, for a luncheon date to talk about importance of the combining the practice of entrepreneurship with the theory from “core” disciplines. I remember the excitement at the University of Texas at Austin when a laboratory, the Austin Technology Incubator, was put in place to see if it could generate companies that could produce about 200 jobs. I also remember all of the people who could not see the vision, and what I have seen in Austin can only be described as a miracle in wealth creation and job creation, a process which must be constantly regenerated in the Schumpeter type economy. More importantly, the model, which is based on the old agricultural model of county agents taking agricultural research from the academy and

labs to the farmer for in order to improve efficiency and yields, brings together the theory and best practices of new ventures and the overall entrepreneurial process.

Going beyond research and teaching entrepreneurship, and carrying innovations to the community, demands that we understand the timelessness of our task. Before moving to a model that brings teaching and practice together, let us briefly revisit the accomplishments of the ancient world that was discussed earlier. This review is intended to show how important it is to understand the scholarly side as we move systematically to a model of theory, teaching, and practice.

Recently, a professor of history and a professor of business wrote a very interesting book entitled *Birth of the Multinational: 2000 Years of Ancient Business History From Ashur To Augustus* (Moore & Lewis, 1999; 1998). In an interesting way it wraps the theories of Simmel, Weber, and Schumpeter around the experiences of groups in the ancient world as they created entrepreneurial economies. For example, they write that “Long before their armies marched up and down the Tigris and Euphrates to terrorize the ancient world, groups of talented Assyrian traders peacefully took up residence in foreign countries hundreds of kilometers away from home, being welcomed by the prince of Babylon, Aram and even distant Anatolia as a blessing and not a scourge. As they formed their numerous commercial colonies in foreign lands, these old Assyrian merchants of the second millennium BC perfected a thousand-year-old system of private enterprise inherited from Sumer and Babylon. Living and trading near the dawn of civilization, these corporate traders, moreover, were innovative to a startling degree, for the commercial structures they created may rightly be described as one of the first attempts at the “entrepreneurial government” being celebrated in the 1990s. Even more

importantly, the business operated by the ancient Assyrian colonists constituted the first genuine multinational enterprises in recorded history” (p. 27).

More and Lewis’s analysis shows the importance of technology transfer and wealth creation in the ancient world. The oldest documents known to humans, written before 3200 BC, are business transactions in the Tigris and Euphrates area. Indeed, the biblical account of Cain, who was creating a city, noted that he created tools out of bronze and iron. It was discovered that when they mixed soft re-brown cooper ore with tin in a super-hot furnace, a harder alloy called bronze was created. As the authors note, “The invention of bronze alloys in foundries where the fires were heated to between 590 and 790 degrees centigrade made it possible for professional metallurgists to mould soft copper and tin into sturdy plows, building tools, kitchen ware and other items destined to vastly increase human productivity in a manner comparable to that o the Industrial Revolution of modern times. ...An urban, commercial and money economy was thus made possible through the molding of bronze, ploughs, sickles and the invention of wheeled donkey-carts, all of which made it possible for the Sumerian farmer to send his excess wheat and barley to feed the new sculptors, carpenters, leather-workers, brick-layers, scribes and others now able to earn a living in places like Uru. (Karl & Moore, 1999; 45).

The major contribution of Moore & Lewis’s work, and others in this tradition (e.g. Rostow, W., 1978; Lewis, D. 1998) is that it connects the past to the present. This scholarship notes that all of the characteristics associated with the modern literature on successful business communities and enterprises were found in the ancient world. Branding and advertising, global economies, virtual corporations, the rise of nations,

foreign investment attraction, industry clusters, knowledge based economy and knowledge workers, being mean and lean, could be found in the ancient world. More importantly, the practice of entrepreneurship is ingrained into the history of the world. Given all of the historical data, one would think that we would have a science of entrepreneurship, with metrics coming from the rich historical data from the ancient world to the present.

In a real sense, combining theory and practice can constitute the science of entrepreneurship. Indeed, like agriculture, practice cannot be divorced from theory. A review of wealth and job creation through entrepreneurship in Austin, Texas, brings this point to bear. Austin shares with other regions such as Silicon Valley and Route 128 in Boston an entrepreneurial boom. Annalee Saxenian, in *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (1996) documented an interesting comparison between the latter two communities. From a theoretical point of view, these communities are the most recent permutations of forms that we have seen since the ancient Assyrians.

Thirty years ago Austin was a solid town with job opportunities dominated by state government and education. As the capital city of Texas, government provided some of the best jobs. The University of Texas at Austin also provided a job market. Within both domains there were primary jobs that provided for great mobility and had great benefits and secondary jobs that did not have great mobility and benefits. There were the usual “mon” and “pop” stores and insurance companies that provided service to the community, and some jobs. But for the most part, Austin was viewed as a place to go for

an education at one of its many universities and colleges, and then find a great job in a major metropolis of the state or outside of the state.

Austin was transformed by what I have referred to earlier as the agricultural model. Instead of simply publishing articles on innovation and entrepreneurship in professional journals, new ideas were taken to the community. These ideas revolved around the creating structures for the entrepreneurial start-up process, technology transfer, and the recruitment of large firms to help establish what has become known as the technopolis. George Kozmetsky, the former Dean of the Business School and founder of Teledyne, was the champion for this community transformation. He understood, and understands, the importance of bringing together theory and practice. But there was not a theory of bringing the two together that had been practiced at the university systematically. As he noted during the early days of this unstructured that was tackled in Austin, when you don't have a body of knowledge, and when you don't have theory, how do you educate people? ... You have to have a laboratory, or a clinic like the medical schools. He said that we are going to start a technology incubator that will be a laboratory for all of our graduate students in science, engineering, business law, liberal arts etc. Austin had both advanced manufacturing and innovation in the same place. In the mist of a recession in 1989, the Austin miracle was launched and a technopolis was created.<sup>1</sup> The Austin Technology Incubator, or a laboratory for learning, was at the center of the technopolis. I prefer the term techno-paradise, which captures the impact of wealth creation on community institutions such as libraries, schools, opera etc. For matters of exposition, we will stick to the term technopolis.

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<sup>1</sup> See the "Entrepreneurial Revolution," PBS series developed by the Kauffman Foundation, Kansas City, Mo. This series takes one through the development of Austin as a technopolis, with an emphasis on new start-ups such as Evolutionary Technologies and giants such Dell Computers.

George Kozmetsky founded The IC<sup>2</sup> Institute in the School of Business and the transformation was put in practice. (Cooper et. Al, 1997). The concept of technopolis was introduced to Austin as a model circa 1989 at a conference that was hosted by the IC<sup>2</sup> Institute. People came from Japan, China, England, France, silicon centers of the U.S. to think about emerging issues in technology commercialization and economic development (Gibson, 1999). As noted by David Gibson, an IC<sup>2</sup> Fellow who has chronicled the emergence of Austin as a technopolis, "...the roots of technopolis-a utopian, radiant city based on science and technology-sprang from the humanistic mind of the Renaissance. The first example was T. Campanella's 17<sup>th</sup>-century vision of a 'City of the Sun.' This was a culturally diverse, polytechnical city-as showcase of science and continuing education. There, science was not just for an aristocratic elite. Philosophers, political planners and social prophets were intrigued by the idea of creating a 'city of light,' designed and ruled by wise scientists, where research and innovation were a way of life and invention and creativity were venerated. The ideal cities were to be the poles around which the economy of nations would grow and society would progress (Gibson, 1999). Gibson further notes that the modern technopolis-techno for technology and polis Greek for city-state-combines research and invention with the practical applications of technology through innovation.

The technopolis is an innovative approach to economic development and links technology commercialization with effective public and private sector initiatives to create new infrastructures for wealth and job development and global competition. The emphasis is on providing both strategic and tactical know-how into developing

infrastructures for the twenty-first century (Gibson, Kozmetsky & Smilor, 1992, Porter, 2001).

The emphasis on the technopolis, or the theory and practice of entrepreneurship, is on researching and creating structures so that entrepreneurs can flourish. It means creating landing zones for ideas so that high growth start-up companies can create wealth, jobs and the entrepreneurial spirit can multiply within a community. Also, the unit of analysis is moved from nations, as was done in Adam Smith's *Wealth of Nations*, to the city or region. The literature on entrepreneurship certainly has captured the importance of regions (e.g. Schell & Davig, 1981; Jones & Clark, 1976; Laumann & Pappi, 1976; Miller, 1975). Indeed, any analysis of wealth creation from the ancient world, from Sumer and Babylon Assyrians, is that they concentrated on structures that produce regions that produced wealth and jobs.

A little closer to our time, let us not forget that the contribution of Annalee Saxenian's *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (1996) was that Route 128 lost great ideas and entrepreneurs because it failed to provide structures for ideas to be successful. On the other hand, what came to be known as Silicon Valley created entrepreneurial structures and grew systematically.

What are these structures that are important for the development of new ventures, as we make a concentrated effort to combine practice with theory? Or as the Guru David Gibson has asked, how do we anoint a city or region with light and wisdom (1999)? Here is his list, quoted directly:

- Quality education at all levels, from kindergarten to the graduate student and beyond.

- Visionaries and implementers at the regional level who come from academia, business and government.
- An entrepreneurial culture: A technopolis is energized by startups and mid-size firms, not just large ones.
- The best technology research-that leads to new industries and home-grown tech companies
- Globally competitive infrastructure-both “physical” as in roads, airports, the Internet, and city services and “smart,” as in talent, capital and know-how.
- A quality of life that attracts and keeps a broad range of talented people, including educators, artists, writers, musicians and poets as well as business people and entrepreneurs.
- Enlightened government with a regional and increasingly global orientation  
(Gibson, 1999)

The first thing that one recognizes here is that when you anoint a city with light and wisdom, there are many partnerships that must be developed. More specifically, it is a partnership between universities, the public sector, and the political sector.

Within the partnership the university provides experts, know-how networks, to individuals who are engaged in the start-up process. Innovations and technologies are transferred from public laboratories and university laboratories. In the case of Austin, an experimental laboratory, which everyone knows now as the Austin Technology Incubator, served as the place where new ideas were tested and developed. This laboratory has been very successful over the years, and was the only institution in the city devoted to start-ups until the process became common place to many institutions and

enterprises. In a sense, it was the catalyst that created the entrepreneurial revolution in Austin.

During a recent trip with my MBA elective course to the incubator, I asked the present director, Dr. Joel Wiggins, to present to the class the numbers on the incubator.

They were impressive:

### **Accomplishments**

- Founded in 1989 to create wealth, generate jobs, diversify Austin's economy, and be a learning laboratory for UT faculty, students, and staff
- First Director: Ms. Laura Kilcrease
- NBIA Incubator of the year in 1994
- Incubated incubators in Silicon Valley, Houston, Texas and Charleston, South Carolina
- International reputation by recruiting start-ups from Brazil, Israel, Canada, Austria and Japan
- 110 plus member companies over ten years
- 65 companies that graduated
- 18 current companies
- Four NBIA award winning companies
- Created 2,850 high paying jobs

### **Wealth Creation**

- ATI companies generated 280 million revenues in year 2000; 1.2Billion since 1989

- Three companies are public on NASdaq: DTM, Concero and Encore Orthopedics
- A dozen graduate companies from ATI has been purchased, including Metrewerks by Motorola for \$95M, EXTI by BMC for \$100M, Exterprise by CommerceOne for \$75M, DTM Corporation by 3D Systems Cooperation for \$45M.
- Companies have raised greater than \$300M in last two years

### **Innovation**

- DTM corporation and silicon metrics spun out of UT Engineering
- CEDRA Corporations spun out of Radian Corporation and Exterprise Corporation spun out of 3M
- Fourth State Technology first spin out of Sematech and ETI first spin out of MCC
- True Dimensions spun out of NASA research
- Isocron Data Corp and several other Moot Corp. winners spun out of U.T. Business School
- Opportunities for students from UT to interact with the ATI process of wealth creation

The major point in presenting the Austin example, which certainly have taken places in other parts of the world on different scales, is to stress the importance of theory and practice: entrepreneurship within the academy is most effective when it has a “do” component. Like all organizations, the Austin Technology Incubator is in the process of reinventing itself so that it can be positioned for its next contribution.

The start-up process, or the renewal and growth process, will certainly benefit from the know-how network within the disciplines of accounting finance, management,

MSIS, and Marketing. One understands when to inject this knowledge into the entrepreneurial process. Like the Agricultural Agent, who takes results from the laboratory to the farmer, the future of the professor of entrepreneurship is to become an entrepreneurial agent for wealth and job creation within cities and regions. Simply presenting case studies in class is a necessary but not a sufficient condition for the science and practice of entrepreneurship. Also, understanding historical data and historical clusters of wealth creation makes the study of entrepreneurship draw from disciplines such as sociology, business history, engineering, bio-technical sciences, and other disciplines.

As we concentrate on practice, it is also important to understand that new innovations within the academy are coming from disciplines as diverse as the bio-technical sciences, engineering, music, pharmacy, and other content producing disciplines within the Liberal Arts. Partnership is the key word. At the University of Texas at Austin one of the most popular courses is entitled “From Lab to Market,” a Management course cross listed with the Colleges of Natural Sciences and Engineering. It is also drawing students from the Law School. They are interacting with venture capitalist, business angels, and the know-how networks within the Austin region.

Combining theory, research and practice, for high growth job production and wealth, is paramount for those interested in the entrepreneurial process. Each region or city, and academies associated with those regions, must take responsibility for maintaining prosperity in our economic system, a system that ask that we be smart as new technologies destroy old technologies and new innovations in ways of doing business replaces others. The test of time has demonstrated what we know, and we must codify

that information into a science of entrepreneurship. What we know tends to come from disciplines other than what is called Macroeconomics. Jacobs Jacobs, in *Cities and the Wealth of Nations: Principles of Economic* (1985) perhaps said it best when noting that we must move to what has worked and stay away from what has not worked: “Macro-economics-large-scale economies-is the branch of learning entrusted with the theory and practice of understanding and fostering natinal an international economies. It is a shambles. Its undoing was the good fortune of having been believed in and acted upon in a big way. We think of the experiments of particle physicists and the space explorers as being extraordinarily expensive, and so they are. But the costs are as nothing compared with the incomprehensibly huge resources that banks, industries, governments and international institutions like the World Bank, the International Monetary Fund and the United Nations have poured into tests of macro-economic theory. Never has a science, or supposed science, been so generously indulged. And never have experiments left in their wakes more wreckage, unpleasant surprise, blasted hopes and confusion, to the point that the question seriously arises whether the wreckage is reparable; if it is, certainly not with more of the same (pp. 6-7).

Again, thank you for inviting me to give the keynote speech for this occasion.

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