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## Chapter 19

### Creativity, Innovation, and the Production of Wealth

**Knut Sogner<sup>1</sup>**

“Adam Smith did not see the Industrial Revolution coming,”— so said my undergraduate teacher in economic history in 1985. In his seminal book *The Wealth of Nations* (1776), Smith lays some of the crucial groundwork for the modern science of economics, but he does not systematically address innovation. Yet parallel to his writing this treatise, the British production system began to usher forth profound changes in the organization of production and in the goods produced. While Smith discussed efficiency, the Industrial Revolution involved innovative change that radically shifted what was achievable in terms of the production of wealth.

During the latter half of the eighteenth century, the Industrial Revolution was in its embryo, so it is understandable how Smith might not have discerned the potential of his very own conception, the natural system of liberty. Yet he did write profoundly about the possibilities of economic change (in particular specialization and how specialization might lead to innovation) and growth. Compared to many modern economists his is a broad and historical approach. Yet economics — with its account of the mechanisms that create balance between what is produced and what is consumed (or, more correctly, between supply and demand) — is hardly able to grasp the many and messy undertakings that alter the supply system, that part of the economy that creates and produces the goods and services under the demand of consumers.

Creativity and innovation help to increase productivity, thereby changing the way in which people earn their livelihoods as well as the goods and services they enjoy. To understand creativity and innovation one must move beyond standard models employed by economists. One must consider, for example, the transformative possibilities engendered by science as well as the ways in which politics and law function to allow, encourage, or incentivize creative acts and beneficial interactions (Fagerberg et al. 2005).

Over the last quarter century new fields of research have emerged that seek to understand positive change in the economy (Fagerberg et al. 2012). The common agenda is to find out how and why innovation, in the broadest sense, happens. The scholars who pursue this agenda range from those interested in corporate success to those who want to understand why nations and societies grow rich. This is, therefore, a vast and heterogenous arena, but this chapter will concentrate on what may be termed *Schumpeterian* innovation, after the Austrian-American economist Joseph Schumpeter. The chapter will, therefore, focus on processes of creativity and entrepreneurship that have, either through intended purpose or as actual result, effected real changes in the production of goods and services—innovation. These sorts of innovations may arrive in a cluster, accumulating during a discrete slice of time, and lead to such radical changes of the economy that we may speak of an “industrial revolution.”

Schumpeter contributed at least three concepts that guide much research on innovation: the “entrepreneur” as agent of innovation (Schumpeter 1934, but see Hébert and Link 2009 for predecessors); a distinction between adaptive and creative economic behavior (Schumpeter 1947); and the idea that innovations be institutionalized within large corporations

(Schumpeter 1943/1976). Schumpeter places these concepts in larger economic landscapes, revealing thereby how processes of creativity and change prove relevant to the whole society. A very important distinction in Schumpeter's definition of innovation, is that invention and innovation are not the same. A new chemical entity, a new way to produce energy, or a novel food recipe, are inventions until the required processes of commercialization turn them into innovations. Indeed, the definition of an innovation is the introduction of something new in the economy (even if the new entity is but a novel reconfiguration of old entities).

While Schumpeter was active in the first part of the twentieth century, his rise to the center stage of a scholarly enterprise devoted to the study of innovation and change is a consequence of the shift from post war growth to crises and volatility that occurred from the 1970s onwards (Van der Wee 1986). Innovation has been seen as more than a necessary tool to solve issues of economic stagnation or to redo old economic structures that contribute to climate change and pollution. In fact, innovation may be regarded as a new tool to achieve economic equality. While revolution and redistribution were leftist political goals for centuries, innovation is a new tool to change the society for the better (Phelps 2013; Mazzucato 2014).

This chapter offers an historic introduction to the broad field of innovation studies with an eye towards ethical matters. Four fundamental issues are highlighted. In the first section, I delineate how the concept of innovation has little place within the framework of standard economic models, yet innovation is crucial to the total economy. In the second section, I take up some theoretical approaches, emerging in the 1980s, that construe the phenomena of innovation as occurring within specific circumstances. This is the "interactive" approach. In the subsequent section, I focus on how innovation has been seen, by some, to be

institutionalized within the large corporation or, in other cases, within clusters of small companies or even the nation state, noting as well how some scholars have argued for cultural or ethical frameworks as catalysts of innovation. In the final section, I canvas some of the debate as to whether or why innovation has failed to return economic growth to the wealthy nations.

### **Innovation and Neoclassical Economics**

Whether the global economy is assessed over time or over geographical space, creative change is both apparent and, for the most, welcomed. Over the last two centuries, the global economy has grown, and large populations, though not in all regions, increasingly have become accustomed to a comfortable life. But, as Schumpeter argued, economics as a science provides little entrance to the idea of economic or productive creativity. Striving to be an exact and encompassing science, economics has been long concerned with static efficiency, namely how best to use available resources to produce some given product (Baumol 2002). The standard model in contemporary economics requires that companies take prices as given and behave in the most efficient way. In this way, the standard models require economic agents, whether individuals or firms, to *adapt* to a given set of production goals in the most efficient manner.

Much — but certainly not all — of how economists see the world, goes back to Adam Smith (Smith 1776/1981; Roncaglia 2001). The wealth of nations, Adam Smith claimed, was measured against the background of a country's population (per capita), and was the result of division of labour and specialization. By dividing work processes into several different tasks and having the workers specialize in specific operations, productivity (production measured

against effort) would rise. This, of course, entailed a kind of innovation. Smith was concerned, in particular, about labor productivity, i.e. the amount of labor going into the production of a unit of something. Efficiency was the goal. The wealth of nations was not, consequently, dependent on balance of foreign trade or on amassing trade surpluses, two contentions defended by Smith's mercantilist predecessors. Foreign trade is only a part of what goes on in an economy, but Smith set out to cover the whole picture.

Smith's approach shifts the balance of economic thinking on growth and wealth from focusing on the guidance of the state or the directives of a ruler (not to mention the accrual of gold via exports) to a framework that emphasizes law, competition, and the improvement of individual lives. The processes of corporate expansion and growth that led to a division of labour is part of what is referred to by Smith's famous appeal to the "invisible hand": An economy characterized by acts of self-interest and the pursuit of profit leads actors and companies, via the mechanisms of the market economy, to put their efforts into activities that best serve society. The potential problem of a society where every actor seeks profit maximization is countered by competition within the rule of law that prohibits fraud and coercion. Competition among companies to supply a certain product increases supply, and thereby lowers prices. The involved companies then adjust the supply accordingly. These mechanisms work throughout the economy, and, in the end, profits for the sale of all products reach the same natural level. Economic actors constantly adjust their behavior according to the natural profit rate. The totality of adjustments of sellers and buyers reaches, thereby, a level of balance, in technical terms, an "equilibrium."

Smith argued against state-led economies and for the benefits of the free market. In a free market economy, each agent may employ his or her own local or situational knowledge in the

pursuit of self-interest (broadly understood). The cumulative result is a powerful dynamic force for creating wealth; in the long run, a centrally directed economy is unable to duplicate or match this result. The only real direct role for the state is to thwart collusion and provide crucial public goods. Smith — who readily acknowledged the presence of self-interest as a potential problem — was under no illusion that companies would not try to avoid competition. For Smith the counteractive mechanism of competition is the key that justifies the self-interest promoted by a free market economy.

The balance achieved in a market economy between supply and demand, and the underlying mechanisms described by Smith, gives an approximation of where economics has developed up until the present. The understanding of the economy as a system that balances supply and demand in a sort of a circular flow proceeds from Smith's earlier analyses, even as current economics is much more detailed and technical, and capable of taking into account aspects not addressed by Smith. The current model of perfect competition makes assumptions that Smith did not employ: No firm is large enough to dominate price setting; each has the same information, the same cost structure and produces equivalent goods and services, all performed in conditions with freedom of entry and exit. These mechanisms lead to situations where every company would experience prices as given. Companies are *adaptive*, but they are certainly not *innovative*.

It is against this model that Joseph Schumpeter's idea of "creative response" acquires its force: "And whenever the economy or an industry or some firms in an industry do something else, something that is outside the range of existing practice, we may speak of *creative response*" (Schumpeter 1947: 150, italics original). Creative responses are actions that forge new paths, for example, moving from horse-drawn wagons to steam trains or to the internal

combustion engine in automobiles. A creative response is, in fact, an act of *entrepreneurship*, a term that Schumpeter uses in a wider and more profound sense than simply as a new venture creation. Schumpeter views creativity and innovation as tightly interwoven. Creativity — entrepreneurship — drives innovation.

In his path-breaking book *The Theory of Economic Development* (1934), Schumpeter treats the entrepreneur as having a dual role. The entrepreneur is a flesh and blood human being who takes risks and acts in an intentional and creative way. However, the entrepreneur's action fulfills a function that could almost be termed a systemic and integral part of Schumpeter's approach to macroeconomics. Indeed, group entrepreneurial actions, motivated by economic circumstance, prove powerful enough to be the drivers of economic cycles. Crises creates opportunities, and the entrepreneurs take them. Joseph Schumpeter also coined a phrase, "creative destruction", to emphasize, thereby, the need for an economy to renew itself (Schumpeter 1943/1976: 83). Economic crises may "rinse" the economy of old methods and products and usher forth novel approaches and goods, aided throughout by entrepreneurial activity.

Schumpeter's creative response is also applicable to the role of the business firm. The business firm may in principle perform exactly the same entrepreneurial role as the individual entrepreneur, and with their extra clout their impact is often greater. There is, of course, a literature about business innovation — innovation *within* the firm — and how companies may organize themselves better through the use of the resources they possess and the capabilities they contain (Penrose 1959/1995; Lazonick 2005; Barney and Clark 2007; Teece 2009). But there exists no easy recipe for how to facilitate growth-creating business

innovation *throughout* society. (For the purpose of this chapter, the business firm is included in the discussion alongside individual entrepreneurs.)

Schumpeter offers a break with the neoclassical model. Creative behavior, he maintains, is about individual acts and novel practices; these new acts and activities rely, in part, on differences in belief (including information, hunches, and knowledge). Yet individual innovations cannot be foreseen or anticipated, only explained after the event itself. For these reasons, innovation is difficult to include in models of the economy, whether a part or a whole. In this sense, neoclassical economics assumes that all producers simply produce the same goods and do so in an efficient way. Yet for the entrepreneur products are not the same and it may be worthwhile for the creative person to consider how or whether new techniques or products might prove viable. The entrepreneur faces uncertainty, not risk, a distinction characterized aptly by Frank Knight:

The essential point for profit theory is that insofar as it is possible to insure by any method against risk, the cost of carrying it is converted into a constant element of expense, and it ceases to be a cause of profits and loss. The uncertainties which persist as causes of profit are those which are uninsurable because there is no objective measure of the probability of gain or loss. (Knight 1951/2013: 116)

It remains true that Schumpeter's entrepreneurs may create what in certain instances (temporal or geographical) amount to monopolies. The aim of monopoly profit is one of the main attractions of innovation. Those who come first on the market with a brilliant new product, may reap enormous profits because of the lack of competition. Not simply self-interest but greed is not unknown in the entrepreneurial world! If one places uncertainty of

outcome at center stage, then a pursuit of profit, including a putatively monopoly profit, suggests that processes of innovation may come fraught with difficult and morally ambiguous challenges.

Entrepreneurial people may not necessarily be nice. The fulfilment of novel projects and processes may require a firm and steady hand; in fact, the sort of “creative destruction” described by Schumpeter may also lead to the neglect of ethical sensitivity. It may turn out that self-interest is not fully constrained by competition. In such cases, there is an argument that the sort of rule breaking that may take place may be ethically defensible because it can create new paths of actions, both morally and economically (Brenkert 2008). But being close to strong-minded entrepreneurs can expose employees, collaborators and relatives to ruthless or cold obsession. These dimensions are not much included in the histories and handbooks of entrepreneurship (Casson et al. 2006; Hébert and Link 2009; Landstrøm and Lohrke 2010), though some of the American “robber barons,” active during the turn of the twentieth century, were entrepreneurs. If there is this “dark side” to entrepreneurship, then it might be approached through the consideration of these questions:

For example, when does persistence become rigidity that stifles the building and sustaining of nurturing relationships? When does entrepreneurial passion turn into a dysfunctional obsession? ...Finally, when does the entrepreneur’s need for dominance and achievement lead to engaging in fraud and corruption that undermines the well-being of the community and society? (Wright and Zahra 2011: 4)

Even taking the above into account the creative entrepreneur by and large remains a heroic figure because of his — and increasingly her — role as promoter of change in the economy.

Fulfilling an entrepreneurial role has been increasingly valued in society, even if there is a “dark side.”

The importance of entrepreneurial innovation has re-emerged since the decade of the 1970s. During the immediate postwar era, the economies of the Western nations were characterized, for almost two decades, by solid economic growth led, in part, by governments’ fine-tuning their budgets, as well as corporate willingness to play along with government objectives. However, from the late 1960s, growth became more difficult, and ever since the steep rise of oil prices in 1973 many of the rich countries have struggled with unemployment and stagnation. The economic crisis of the 1970s changed many people’s (not necessarily economists’) perception of the value of economics as a predictive and useful science in a national planning sense. Economists such as Ludwig von Mises (1949), F.A. Hayek (1960) and Milton Friedman (1962), who for a long time had criticized postwar western economics for being too dominated by the state and for ignoring the role of decentralized decision-making for allocating resources, came to prominence (Van der Wee 1986). Schumpeter and his ideas were mere shadows in the background, however, in the turn to market-based solutions and deregulation of the late 1970s and early 1980s (Frieden 2006). This was an era of highly visible political reformers such as Ronald Reagan and Margaret Thatcher, and most western countries tried their hand at withdrawing the state from taking direct action in the economy. By and large, this was a political and economic undertaking to promote international competitiveness and entrepreneurship: trim the public sector and thereby increase the room for private entrepreneurship. Even so, in most countries economic growth remained lower than in previous decades. There was no new industrial revolution in the form of solid and transformational economic growth. There was a need for new thinking about how innovation and creativity could promote economic growth.

## **The Interactive Approach to Innovation**

Individuals such as Bill Gates, Steve Jobs and others are often seen as “game-changers” in the economy, creative agents emblematic of the innovative entrepreneur. However, the academic understanding of innovation has moved beyond the heroic individual to develop a more contextual approach to understanding innovation and entrepreneurship. This sort of approach focuses on circumstance and how situational opportunity provides conditions for innovation. Often called the “interactive approach,” because of how situational opportunity presents connections and relations among individuals, companies, and circumstances, this perspective also focuses on how the people involved in these creative processes are generally normal wage-earning employees who are, so to speak, “just doing their jobs.”

Such an approach gained prominence in the early 1980s with the evolutionary account of innovation offered by two economists, Richard R. Nelson and Sidney G. Winter. In *An Evolutionary Theory of Economic Change* (1982), they built on earlier work by Armen Alchian (1950), who had argued that the economy should be construed as an evolving system with analogues to biological evolution: selection mechanisms for actions from units or organisations (companies) that have established routines and are searching for new and better ways to do business.

Although influenced by Alchian, and by Schumpeter as well, Nelson and Winter also acknowledged their debt to two other economists, whose work exemplified the Austrian School of economic thought rather than the neoclassical. These were Israel Kirzner and F.A.Hayek. Kirzner has long recognized the signal importance of entrepreneurship to the

economy. It is, he argued, through the actions of entrepreneurs that opportunities are recognized and acted on. Kirzner criticizes Schumpeter's approach to entrepreneurship as not sufficiently attentive to the dynamic of the market economy and to the crucial role of entrepreneurial alertness: "Instead of identifying the profits captured ex post by the entrepreneur, we must focus attention on the profit possibilities which serve to attract the entrepreneur." (Kirzner 1971: 208; see also Kirzner 1973). Kirzner shares with his forerunner Hayek a micro understanding of the economy's core processes. Hayek characterizes the economy not as one coherent whole, oriented to a specific end, but as several smaller "economies" connected by the price mechanism. Price changes are bits of information that lead to changes in the actions of individuals, organizations, and firms. The actual market order is not a world of perfect information. Competition is not, therefore, a static state but a process for discovering facts in the form of what is desirable and achievable, and how (Hayek 1945, 1978). Together Kirzner and Hayek portray the economy as a constantly changing entity in which entrepreneurship is an important way of achieving change.

For Nelson and Winter, innovation is a result of corporations striving to improve their profits through new products. The economic actors are profit seekers, as in mainstream economics. But they are acting in a world of bounded rationality — a world without full information — in which striving for innovations creates differences among companies. Learning from interacting with the environment is important. Companies develop unique knowledge that creates differences among firms and among their products; such differences, mutations in the biological jargon, are either selected or discarded in the market based on their specific characteristics. This is a model of an evolving and changing economy, with companies that act differently from each other, within an economy operating with "selection mechanisms" in addition to price.

During the 1980s, Nelson & Winter's approach was developed in close communication with Chris Freeman and Nathan Rosenberg, scholars who, among others, were influenced by Schumpeter. The British economist Chris Freeman perceived that Schumpeter's cycles of creative destruction were parts of long waves resting on shifts in technological foundations (Freeman and Soete 1997; Freeman and Louçã 2001). Fundamental kinds of technology were introduced into the economy as innovations altering long-term growth patterns. Freeman identified several such historical waves, two of which merit notice. The second great wave of innovation, taking place from the 1840s to the 1890s, rests on the industrial revolution with its resultant growth in the numbers of professional engineers, institutes of technology, as well as in the steady rise of mass primary education and the emergence of railways, telegraph, and the use of steam power, coal and iron. In the 1990s, according to Freeman, a fifth long wave came forth based on global research and development networks, lifetime education and training, information highways, digital networks, microelectronics, and gas and oil. The technical and institutional context provided by Freeman and associates could be combined with the evolutionary approach of Nelson and Winter.

For several decades Chris Freeman has developed and maintained a global center for innovation studies, namely the Science Policy Research Unit (SPRU) at University of Sussex in Brighton, UK. Freeman and SPRU blended Schumpeter and science and technology studies (STS), as originally influenced by Thomas Kuhn's book, *The Structure of Scientific Revolutions* (1962). Kuhn demonstrated that science was not developing only according to its own internal logic, but through the formation of paradigmatic regimes involving subjective beliefs that were not necessarily rooted in unquestionable scientific facts. Freeman's long

waves could be seen as “techno-economic paradigms” (Freeman 1989), an expression that for a time was much employed in the field.

During the 1980s several independent academic developments came to support the approach of Nelson and Winter, and Freeman too. A common theoretical position was to place particular emphasis on different types of contextual features: locality, nation-state, communication networks, or institutional settings. Innovation was seen as a result of interactive processes of various kinds in which “learning” is the key, often via a feedback mechanism, through personal communication, or from a particular situation, be it geographical, national, legal, or cultural. Market-signals, technological knowledge, access to skills, initial markets, illustrate the advantages that firms and individuals could gain from positive interactions within such situations.

The appeal to situation or context provided, in effect, a critique of another view propagated first by Vannevar Bush in 1945: that the root cause of technological and economic progress was science (“Science as the Endless Frontier”), and that a nation would advance so long as science progressed. But in fact many students of science and technology, rejected Bush’s theory. The influential historian of technology Thomas P. Hughes wrote a book about the electrification of western society called *Networks of Power* (Hughes 1983; see also Hughes 1986) in which he emphasized not the advance of science itself but the complex web of actors and processes of technology and their responses to different circumstances.

Possibly the seminal contribution to the interactive approach is one that takes into account both economics and business—that of Stephen J. Kline and Nathan Rosenberg. In their essay, “An Overview of Innovation” (Kline and Rosenberg 1986), they summarize recent work on

economics and technology (to which Rosenberg in particular had contributed significant elements, even influencing Nelson and Winter, as in Rosenberg 1976, 1982). Kline and Rosenberg point out that a central assumption of much science policy has been the belief that science and technology developed in tandem: as suggested by Vannevar Bush, science provided a basic input that laid the groundwork for technology and development, and from that would follow production and marketing. However, according to Kline and Rosenberg, this assumption of linearity was not correct. As they contend,

An improved model of innovation indicates not one, but rather five major pathways that are all important in innovation processes. These paths include not only the central-chain-of-innovation [research-development-production and marketing], but also the following:

numerous feedbacks that link and coordinate R & D with production and marketing;

side-links to research all along the central-chain-of-innovation;

long-range generic research for backup of innovations;

potentiation of wholly new devices or processes from research; and much essential support of science itself from the products of innovative activities, i.e., through the tools and instruments made available by technology (Kline and Rosenberg 1986: 303)

From the perspective of a company, Kline and Rosenberg proposed a more complex process of interaction than the traditional view that gave a special role to science. Innovations coming out of companies were not necessarily an application of a scientific insight, but of longer and more complex processes that involved very different departments and included both internal and external relations. The department of marketing, for example, could be the initial mover of something that would lead to a number of further responses and developments over time. In the end, marketing could influence the direction of science! An illustrative example of how the interactive approach turns traditional presuppositions on their head might be glimpsed in the simple fact that the science of thermodynamics developed because of the existence of the steam engine, not the other way round as the conventional view had assumed (Nelson 1993: 7).

Out of the interactive approach grew the recognition of the economic relevance of feedback mechanisms, intentional communication, even unintended and positive spillovers from activities, also called externalities—whatever one called the relations between companies, their networks, customers, and their wider surroundings, be they other companies, universities, suppliers, or individuals. Yet this sort of approach to innovation did not point only to seemingly opaque or difficult-to-understand micro processes but to larger patterns as well. In this sense, the interactive approach also could be seen as indicative of larger patterns of economic developments: The interactive approach was coupled with institutional analyses; in this way, national, regional or local environment became relevant to innovation studies. This contextual emphasis led, in the late 1980s, to the concept of a “system of innovation.”

### **Innovation Institutionalized**

The rise of institutionally focused innovation studies changed the field. Schumpeter had identified the elusive entrepreneur, but the institutional approach made it possible to look for complex business and social arrangements; suddenly, law, regulations and public policy mattered. There was a clear shift from the uneasy search for the creativeness of the individual to the attempt to identify what kind of stable arrangements held the key to institutionalize positive processes of innovation.

In fact, Schumpeter did influence the turn to institutionalization. Although his last, important book, *Capitalism, Socialism and Democracy* (1943/1976) did not focus on innovation, Schumpeter predicted there that innovation would be increasingly institutionalized in the research and development function of large corporations. He did not mince words:

The perfectly bureaucratized giant industrial unit not only ousts the small or medium-sized firm and “expropriates” its owners, but in the end it also ousts the entrepreneur and expropriates the bourgeoisie as a class which in the process stands to lose not only its income but also what is infinitely more important, its function. The true pacemakers of socialism were not the intellectuals or agitators who preached it but the Vanderbilts, Carnegies and Rockefellers. (Schumpeter 1943/1976: 134)

If innovation could be institutionalized in large corporations, then in Schumpeter’s estimate there was no need for independent entrepreneurship. While Schumpeter’s earlier book introducing the entrepreneur was written as a young man early in the twentieth century, *Capitalism, Socialism and Democracy* came more than thirty years later, after he was established as a professor at Harvard. The rise of American big business had influenced Schumpeter to such a degree that he made quite a turnaround. And Schumpeter, the macro

analyst, did indeed, unlike most of his pupils, name some of the “robber barons” among the important entrepreneurs of the past. Entrepreneurship (also) called for forceful people.

### *Innovation and the Corporation*

One of the most powerful arguments for the innovative might of the large corporation, came from the Harvard Business School historian, Alfred Chandler. Through several articles and three important books, with the telling titles *Strategy and Structure* (1962), *The Visible Hand* (1977), and *Scale and Scope* (1990), Chandler argued that the rise of the large, vertically integrated corporation in USA created economic advantages that explained why the United States became the richest economy in the world. Combining large marketing operations, strong research and development, and an elaborate and meritocratic management structure, the large corporation was able to reach a level of efficiency no other corporate system could. Large American corporations had lowered unit costs so much that they offered cheaper and often better products than would a competitive market constituted by smaller companies. This outcome ran counter to the standard economics argument that such a situation — oligopolistic competition— would in itself would lead to higher prices. Chandler acknowledged that (large) firms would benefit from smaller transaction costs than otherwise obtainable through market transactions. However, his main argument was that big businesses not only appropriated the innovative work of smaller corporations but also created functions and capabilities that were not available in the market—hence the title *The Visible Hand* (Chandler 1977).

In 1977 when *The Visible Hand* was published, the belief in the superiority of the large corporation was beginning to crumble. By 1990, when Chandler published *Scale and Scope*,

the vertically integrated large-scaled American corporation was hardly a model any more. It was associated with the Keynesian economic policy of the postwar period whose fine-tuning of the economy had catered to stable political and economic conditions for large corporations. Already in the 1980s, an important critique had claimed that the success of Chandler's big companies was as much a result of ideology and fashion as real economic forces (Piore and Sabel 1984). Through flexible specialization, it was argued, communities of companies located within easy distance of each other could utilize scale and scope advantages while also providing a flexibility that proved to be a comparative advantage to the big business corporation in the face of unexpected and changing market conditions.

The rise of the huge internet technology (IT) sector in Silicon Valley was based on such a flexible specialization concept. Companies were smaller, people moved between companies, universities provided knowledge, and vertical specialization replaced vertical integration as some companies provided components for many other companies. Of course, no one would call Silicon Valley an example of flexible specialization any more. Apple, Intel, Cisco, Google, to name a few, have become giants that outwardly resemble Chandler's big businesses (although they are very different from the traditional large corporation in that the firms of Silicon Valley are financially orientated, vertically specialized and innovate in part through the acquisition of firms).

Within mainstream economics, Chandler's positive view of large corporations has hardly been taken seriously. One important exception is the influential economist William J. Baumol, who writes about corporations, and in particular those of a certain size (see *The Free-Market Innovation Machine* 2002). Similarly, Chandler's younger colleague at Harvard Business School, Clayton Christensen, has argued that large and established corporations are

inherently vulnerable (Christensen 1997/2006). He cites examples of larger and successful corporations with leading technology that, in the longer run, fall victim to disruptive innovation. Smaller, less established companies that get a foothold in the market with cheaper and less advanced products in the same segment may build their positions gradually and in the end assume a dominant position. The new firms have a different customer base and have a different product strategy and lower costs. The old firms might be aggressive, change-oriented and resourceful, but may fall into the trap of listening too intently to (part of) their customer base (a “squeaky wheel bias,” see Heath 2006), leading them on what in the longer run is an unproductive path.

### *Systems and Clusters of Innovation*

One of the pivots to institutionalism emerged with a focus on complex aggregations of firms, particularly those called “systems of innovation” or “clusters”. Explanations of these systems or clusters combine an interactive approach with the institutional-political approach exemplified by “flexible specialization” noted above: Communities or networks of companies are understood within political and institutional contexts. The system of innovation approach, applied by several authors coming from the SPRU-based network (see above, p. X), and utilized in Harvard-based Michael Porter’s cluster theory, emerged in tandem in the late 1980s and early 1990 (Dosi et al. 1988; Lundvall 1992; Nelson 1993; Porter 1990). By and large, the two approaches are similar in that each emphasizes interactions between companies and their environments — including other companies and organizations, as well as the legal and regulatory context. In early formulations, each approach had a clear footing in national (and regional) institutions. For example, factor conditions (education levels, infrastructure), the initial market, relevant business

surroundings, and patterns of governance and labour relations reflected national laws and historical traditions. Many countries, in the latter part of the twentieth century, also enacted industrial policies whose assumptions and constraints reflected national priorities.

Although there are great similarities between Porter and the SPRU-based-network, there remain significant differences. For Michael Porter a cluster represented local aggregations of companies in the same sector. A combination of intentional collaboration and unintentional knowledge flows from the local activity of people changing jobs, interacting with subcontractors (who in turn cater to more than one customer), and communicating with the community. Schools, universities and a specialized infrastructure would give the companies in these clusters additional advantages compared to companies without such fruitful surroundings. For Porter competition among companies within the cluster was also important. Porter's approach was reminiscent of the famous and influential English economist Alfred Marshall's concept of industrial districts, back when the British industrial company — located in particular areas, characterized by vertical and horizontal specialization, as well as a competitive climate — represented the state of the art in global production systems. In the British industrial districts, Marshall said, "mysteries of the trade become no mysteries; but are as it were in the air" (Marshall 1961: 271, quoted from Lazonick 2005: 35).

However, the theories of the SPRU scholars emphasized a national systems of innovation-approach that was much more loose-knit and flexible than Porter's clusters. It is fair to claim that Porter's approach represented a more neoclassically inclined approach in which competition was included, while the SPRU-approaches were more or less influenced by evolutionary economics. In the evolutionary perspective, developments would prove more random than in a tightly knit Porter-cluster, but the broader national institutional setting

would be a strong constraining factor. Two of the pioneers in this national approach, Bengt-Åke Lundvall and Charles Edquist, provided an interpretation of Danish innovative developments:

The process of technical change in Denmark is organized neither by big firms nor by the state. It is quite self-organized. The only reasonably strong coordinating block in the economy has been the export-oriented, and cooperatively organized, agroindustrial sector (Edquist and Lundvall 1993: 281–2).

As noted previously, much work has been done to develop the perspective of innovation as local, regional or sectoral systems (Asheim and Gertler 2005; Malerba 2005). To render the interactive perspective relevant to local, regional or sectoral requires examining smaller entities with numerous interactions. Such an approach may be employed in a different research environment, such as the examination of long-term innovation processes in the state of Minnesota, as detailed by Andrew Van de Ven and colleagues in, *The Innovation Journey* (1999).

### *Open Innovation and Aggregations*

Another and related approach that has gathered a lot of interest outside of academia, is Henry Chesbrough's "Open innovation": if companies open up their processes of innovation and bring others in, they can share the burden and stimulate each other (Chesbrough 2003). To invite others in may serve as a tool with which a common solution, brought forward by several partners, stands a better chance to succeed as a viable product or a process. Open innovation is also a way of sharing, or spreading risks: putting one's economic eggs in more

than one basket through establishing external relations. The ideas behind open innovation are very similar to the innovation/cluster-approach, and reflect as well the older notion of flexible specialization. Clearly, much of what has been written and thought about innovation over the last thirty years plus is inspired by the remarkable rise of the IT businesses of Silicon Valley in California.

Aggregations are good at a particular type of innovation — small and gradual improvements that spread among companies, where no single company or innovation is of particular importance. Such piecemeal and accumulated improvements are found in the progressive development, over the twentieth century, of cars and airplanes, goods typically manufactured by international businesses whose breakthroughs (some more important than others) exemplify gradual or incremental development (Nelson 1993). Positive changes are often the result of everyday work by normal employees, not the outcomes of risk-taking entrepreneurs obsessed by some particular idea. The other type of innovation is the radical sort — a new drug, or a remarkable new innovation that changes the rules of the game in a specific sector. For either kind of development, piecemeal or revolutionary, the chances of success are greater if the firm is located within the right region and nation for that kind of activity. The support of the surrounding factors, firms, and people are important for the whole process from breakthrough through product development and marketing.

### *Law, Culture, and Ethics*

Constructing aggregations may seem like a good idea to promote economic development. However, the examples of the successful institutionalization of innovation in these clusters and systems come from Western countries. This fact points to a larger institutional

framework distinct from locality and the interactive support therein. Without a well-functioning legal system (the rule of law), entrepreneurial activities and processes of innovation are hardly possible. Many countries have the right legal frameworks, at least in script, but poor countries often lack the means — including the actual political willingness — to enforce effectively the property rights and contract law essential for economic experimentation, development, and innovation (Cooter 2005). Without these basic protections of one's efforts and of potential rewards, why should anyone undertake to develop new ideas or experiment with new techniques of production? After all, as Schumpeter reminds us, innovation challenges the status quo and defies those whose power rests on the preservation of the status quo.

Framing innovation as nationally facilitated and constrained leads to the grand synthetic grasps of, for example, David S. Landes's *The Wealth and Poverty of Nations: Why Some Are So Rich and Some Are So Poor* (1998), or Daron Acemoglu and James A. Robinson's *Why Nations Fail. The Origin of Power, Prosperity and Poverty* (2012). Approaches such as these introduce into the discussion different cultural habits and institutional settings among the nations and regions and treat these as relevant to innovation and the realization of economic growth. Landes's book in particular has been controversial because he explains that the west is richer than the rest through the early adoption of a capitalist culture with a technological aptitude. Acemoglu and Robinson argue, on the other hand, for an institutional explanation, dividing countries between those that have inclusive and those that have extractive economic and political institutions. The latter countries, which are also poorer, function for the benefit of an elite rather than for industrious people.

In a recent three-volume account of the great economic growth experience of the last 200 years, Deirdre McCloskey has argued that shifts in ethical values explain how ingenuity through individual effort has been unleashed. The rise of individual liberty through new political constitutions (as in France, and the United States, Norway, among other nations) and the ensuing development of ideas, gave rise to what McCloskey calls “the double ideas of liberty and dignity” (2016: xxxiii). Dignity incorporates both a pride and a moral fulfillment in one’s work and effort, especially of the commercial sort. The rise of the new, proud, and commerce-oriented individual emerged most fully in the eighteenth and nineteenth centuries but these ideas found their earliest roots in England and the Netherlands. The changing ideas about the moral value of commerce as a human activity (*from* being disreputable and unproductive activity *to* a worthy and creative pursuit reflective of the Judeo-Christian idea that human beings are made in God’s image) would inspire waves of innovation that account for the wealth of the West today. McCloskey’s twin appeals to specific political institutions and ethical ideas serves to directly refute Landes’s long-term cultural approach. Her argument against Acemoglu and Robinson’s institutional explanation suggests, similarly, that it omits the constitutive role of ethics in guiding and justifying the everyday activities of individuals. For McCloskey, differences in productive capacity rests in very significant part on whether political institutions allow the freedom to produce and exchange and whether the majority of the people believe in and work for the principles that such institutions express (McCloskey 2006, 2010 and 2016, and see especially her “Exordium,” in the book of 2016).

### **Living in an Unsuccessful Age?**

So mankind, especially in the western nations, has grown richer. But what is happening in the world today? Do communities of companies — a system, cluster, or ecosystem — belonging

to a kind of geographical entity create more economic growth than the companies not situated within such contexts? It is fair to say that they do, at least in most circumstances. To a great degree, these institutionalized arrangements have grown up through long term and complex processes. They have stood the test of time and the test of competition. But are they reflective more of successful and particular historical processes than of examples that may be, so to speak, exported as solutions for less successful localities, regions, or companies? One cautionary note is that economic growth in the western world has not been impressive over the last couple of decades.

In a recent book the American economist Robert J. Gordon argues that the American economy since about 1970 has not produced the same economic growth as in previous decades (Gordon 2016). The innovations of the last four to five decades are simply not up to the standard of the innovations of the special century following the American Civil War. This is not an entirely new argument, as Tyler Cowen has argued a similar conclusion (Cowen 2011), but Gordon supports his argument with massive empirical work. As Gordon summarizes,

Our central thesis is that some inventions are more important than others, and that the revolutionary century after the Civil War [for example, the introduction of electricity into daily life] was made possible by a unique clustering, in the nineteenth century, of what we will call the “Great Inventions”. This leads directly to the second big idea: that economic growth since 1970 has been simultaneously dazzling and disappointing. This paradox is resolved when we recognize that advances since 1970 have tended to be channeled into a narrow sphere of human activity having to do with entertainment, communications, and the collection and processing of information. For the rest of

what humans care about — food, clothing, shelter, transportation, health, and working conditions both inside and outside the home — progress slowed down after 1970, both qualitatively and quantitatively. (Gordon 2016: 2)

Gordon finds that the contributors to growth have changed over time. For example, inventions (which, in the terminology of this article are innovations, i.e. they are taken into use in the economy) and technical change have contributed less since 1970 than in the period before. He draws this conclusion by comparing what is called “total factor productivity” — the contribution of everything that is not labor, and capital, often understood to be improvements in techniques, methods, knowledge and such.

Gordon believes the potential for continued improvements has decreased because so many fundamental advances (for example, safe drinking water, improvements in transportation) can happen only once. He paints a grim picture of our current age, and points to the growing social divide in the USA. He suggests that a *second* industrial revolution, starting at the end of the nineteenth century and extending into the twentieth, should be recognized as particularly important compared with what went on before and what came after.

Whether the American economy (or that of other nations) will explode again with productive creativity will have to resolve itself. Gordon does not really explain why such a special century emerged or why he is pessimistic about the future possibility of presently unknown and important innovations. His book details the improvements that contributed to the special century, but there is not one, clear lesson to be taken from his account, a point iterated by a fellow economist (Margo 2016).

What is particularly noteworthy from the perspective of this chapter, is the overlap in time frame of the perspectives of Gordon and Alfred Chandler. Gordon's special century matches Chandler's claim that the rise and innovative efficiency of big business was an important growth factor for United States. Does Chandler's rise of big business help explain Gordon's special century? And consequently, when the fortunes of big business waned during the troubled times of the 1970s, never really to come back in favor, does that explain the lack of rise in productivity?

There is no easy answer to those questions, but there is another theme that Gordon and Chandler share about development in the USA and the western world since the 1970s: The rise of inequality. For Gordon this is manifest in the per capita living standards. For Chandler, the power shift from a meritocratic leadership group to shareholders was a negative move undermining the grasp and innovative strength of big business (Chandler 1990). Shareholder value, as a concept, has become isolated as singularly important but in previous periods it was part of a larger concern—the creation of corporate value, comprising shareholders, managers, and other employees working together as a whole. Efficiency seems to be prioritized in shareholder capitalism, possibly to the detriment of innovation.

Gordon is right in emphasizing future unpredictability. The essence of innovation is unpredictability. The reason “the unforeseen innovations” are not already here, is because of our inability to imagine them. That is the core of what innovation is. But it is food for thought that our preoccupation with innovation comes at a historical time when, seemingly, not enough innovation is delivered to keep the economy growing as fast as we became accustomed to up until the 1970s.

## **Concluding Remarks**

Innovation and creativity are at the same time alluring and frightening. On the one hand, innovative goods and processes, and the aspirations to realize these, suggest progress; they renew hope and offer something to strive for or to anticipate. On the other hand, they also suggest the crumbling of known entities, with its concomitant uncertainty, anxiety, and apprehension. Whether such processes and novel events pose more difficult psychological if not ethical challenges than more stable economic situations is difficult to say.

It is a well-known fact that change may be challenging. It is worth remembering that the mighty movement forward for long-term economic growth, the Industrial Revolution of the late eighteenth century, was shaped by an earlier period known as the Enlightenment (Mokyr 2009). For all the harsh conditions and tragic individual outcomes of the long ascent of the industrial economy, the development of the economy was shaped by attitudes and ideas of how better societies could be created. These aspirations played a role in making industrial society sustainable, and such positive caution should be applicable to our own future. Maybe Robert Gordon's "slow growth" conclusion should be seen as proof of the failure of the economic policies created in the 1970s for increased competition. In particular, an attempt to capture ways that innovation may be institutionalized can appear as futile in light of that slow growth. Perhaps even the attempt to realize clusters, systems of innovation, even specific benefits from the free market may remain difficult to realize. No wonder some innovation scholars are crying for more action from the state (Mazzucato 2014; Schot and Steinmueller 2016). Yet, in a genuinely liberal economy there will always be a need for Schumpeter's entrepreneurial action and for creative responses, at least if the economy is to continue to grow.

## Essential Readings

Innovation studies begin (and may even end) with Joseph Schumpeter's *The Theory of Economic Development. An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* (1934). There Schumpeter outlines the essence of entrepreneurship and economic innovation. Richard Nelson and Sidney Winter's *An Evolutionary Theory of Economic Change* (1982) is a landmark in the establishment of the field of innovation studies. In "Exploring the Emerging Knowledge Base of 'the Knowledge Society'," *Research Policy* (2012), Jan Fagerberg, Hans Landstrøm and Ben R. Martin provide an excellent overview of entrepreneurship and innovation studies. There also exists a number of insightful handbooks and histories, two of which merit attention: Jan Fagerberg, David C. Mowery and Richard R. Nelson (eds), *The Oxford Handbook of Innovation* (2005) and Robert F. Hébert and Albert N. Link, *A History of Entrepreneurship* (2009).

For further reading in this volume on the nature, ethics, and conditions of innovative entrepreneurship, see chapter 16, "The Ethics of Entrepreneurship." On the role of the entrepreneur in society, see, chapter 7, "Can Profit-Seekers Be Virtuous?" On the ways in which current economics has influenced our understanding of business ethics, see chapter 17, "The Contribution of Economics to Business Ethics." For a discussion of economic motivation and obstacles to economic progress, see chapter 21, "Regulation, Rent-Seeking, and Business Ethics." For an account of recent innovations in the organizational forms of corporations, see chapter 15, "Alternative Business Organizations and Social Enterprise."

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