



创新生态系统

——理论与实践研究

Innovation Ecosystem
——Research on the Theory and Practice

王圣元 戴孝悌·著



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Chapter 1 Innovation

1 Innovation

Innovation is: production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome. (OECD: Organisation for Economic Co-operation and Development)

Two main dimensions of innovation were degree of novelty (patent) i. e. whether an innovation is new to the firm, new to the market, new to the industry, and new to the world and type of innovation, whether it is process or product-service system innovation.

Innovation can be defined simply as a “new idea, device or method”. However, innovation is often also viewed as the application of better solutions that meet new requirements, unarticulated needs, or existing market needs. This is accomplished through more-effective products, processes, services, technologies,

or business models that are readily available to markets, governments and society. The term “innovation” can be defined as something original and more effective and, as a consequence, new, that “breaks into” the market or society. It is related to, but not the same as, invention. Innovation is often manifested via the engineering process.

While a novel device is often described as an innovation, in economics, management science, and other fields of practice and analysis, innovation is generally considered to be the result of a process that brings together various novel ideas in a way that they affect society. In industrial economics, innovations are created and found empirically from services to meet the growing consumer demand.

2 Innovation economics

Innovation economics is a growing economic theory that emphasizes entrepreneurship and innovation. Innovation economics is based on two fundamental tenets: that the central goal of economic policy should be to spur higher productivity through greater innovation, and that markets relying on input resources and price signals alone will not always be as effective in spurring higher productivity, and thereby economic growth. This is in contrast to the two other conventional economic doctrines, neoclassical economics and Keynesian economics. Joseph Schumpeter was one of the first and most important

scholars who extensively have tackled the question of innovation in Economics. In contrast to his contemporary John Maynard Keynes, Schumpeter contended that evolving institutions, entrepreneurs, and technological changes were at the heart of economic growth, not independent forces that are largely unaffected by policy. He argued that “capitalism can only be understood as an evolutionary process of continuous innovation and ‘creative destruction’”.

But it is only within the last 15 years that a theory and narrative of economic growth focused on innovation that was grounded in Schumpeter’s ideas has emerged. Innovation economics attempted to answer the fundamental problem in the puzzle of total factor productivity growth. Continual growth of output could no longer be explained only in increase of inputs used in the production process as understood in industrialization. Hence, innovation economics focused on a theory of economic creativity that would impact the theory of the firm and organization decision-making. Hovering between heterodox economics that emphasized the fragility of conventional assumptions and orthodox economics that ignored the fragility of such assumptions, innovation economics aims for joint didactics between the two. As such, it enlarges the Schumpeterian analyses of new technological system by incorporating new ideas of information and communication technology in the global economy.

Indeed, a new theory and narrative of economic growth

focused on innovation has emerged in the last decade. Innovation economics emerges on the wage of other schools of thoughts in economics, including new institutional economics, new growth theory, endogenous growth theory, evolutionary economics, neo-Schumpeterian economics—provides an economic framework that explains and helps support growth in today's knowledge economy. Leading theorists of innovation economics include both formal economists, as well as management theorists, technology policy experts, and others. These include Paul Romer, Elhanan Helpman, W. Brian Arthur, Robert Axtell, Richard R. Nelson, Richard Lipsey, Michael Porter, Christopher Freeman.

Innovation economists believe that what primarily drives economic growth in today's knowledge-based economy is not capital accumulation, as claimed by neoclassicism asserts, but innovative capacity spurred by appropriable knowledge and technological externalities. Economic growth in innovation economics is the end-product of knowledge (tacit vs. codified); regimes and policies allowing for entrepreneurship and innovation (i. e., R&D expenditures, permits, licenses); technological spillovers and externalities between collaborative firms; and systems of innovation that create innovative environments.

In 1970, economist Milton Friedman said in the *New York Times* that a business's sole purpose is to generate profits for their shareholders and companies that pursued other missions would be less competitive, resulting in fewer benefits to owners,

employees, and society. Yet data over the past several decades shows that while profits matter, good firms supply far more, particularly in bringing innovation to the market. This fosters economic growth, employment gains, and other society-wide benefits. Business school professor David Ahlstrom asserts: “The main goal of business is to develop new and innovative goods and services that generate economic growth while delivering benefits to society.”

Empirical evidence points to a positive link between technological innovation and economic performance. Additionally, innovation capacity explains much of the GDP growth in China between 1980—2017. The development of a National Innovation System through heavy investment of R&D expenditures and personnel, patents, and high-tech/service exports strengthened China’s innovation capacity. By linking the science sector with the business sector, establishing incentives for innovative activities, and balancing the import of technology and indigenous R&D effort, both countries experienced rapid economic growth in recent decades. Also, the Council of Foreign Relations asserted that since the end of the 1970s, the U. S. has gained a disproportionate share of the world’s wealth through their aggressive pursuit of technological change, demonstrating that technological innovation is a central catalyst of steady economic performance. Concisely, evidence shows that innovation contributes to steady economic growth and rise in per capita income.

However, some empirical studies investigating the innovation-performance-link lead to rather mixed results and indicate that the relationship be more subtle and complex than commonly assumed. In particular, the relationship between innovativeness and performance seems to differ in intensity and significance across empirical contexts, environmental circumstances, and conceptual dimensions.

The primary domain of innovation is commerce the key data resides there; continually out of campus reach in reports hidden within factories, corporate offices and technical centers. This recusal still stymies progress today. Recent attempts at data transference have led, not least, to the “positive link” being upgraded to exact algebra between R&D productivity and GDP allowing prediction from one to the other. This is pending further disclosure from commercial sources but several pertinent documents are already available.

While innovation is important, it is not a happenstance occurrence as a natural harbor or natural resources are, but a deliberate, concerted effort of markets, institutions, policymakers, and effect use of geographic space. In global economic restructuring, location has become a key element in establishing competitive advantage as regions focus on their unique assets to spur innovation (i. e. , information technology in Silicon Valley, CA). Even more, thriving metropolitan economies that carry multiple clusters (i. e. , Tokyo, Chicago, London) essentially fuel national economies through their pools

of human capital, innovation, quality places, and infrastructure. Cities become “innovative spaces” and “cradles of creativity” as drivers of innovation. They become essential to the system of innovation through the supply side: ready, available, abundant capital and labor; good infrastructure for productive activities, and diversified production structures that spawn synergies and hence innovation. In addition they grow due to the demand side: diverse population of varying occupations, ideas, skills; high and differentiated level of consumer demand; and constant recreation of urban order especially infrastructure of streets, water systems, energy, and transportation.

3 Creative destruction

3.1 Marx's thought

Creative destruction, sometimes known as Schumpeter's gale, is a concept in economics which since the 1950s has become most readily identified with the Austrian American economist Joseph Schumpeter who derived it from the work of Karl Marx and popularized it as a theory of economic innovation and the business cycle.

According to Schumpeter, the “gale of creative destruction” describes the “process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one”. In

Marxian economic theory the concept refers more broadly to the linked processes of the accumulation and annihilation of wealth under capitalism.

The German Marxist sociologist Werner Sombart has been credited with the first use of these terms in his work *Krieg und Kapitalismus* (*War and Capitalism*, 1913). In the earlier work of Marx, however, the idea of creative destruction or annihilation implies not only that capitalism destroys and reconfigures previous economic orders, but also that it must ceaselessly devalue existing wealth (whether through war, dereliction, or regular and periodic economic crises) in order to clear the ground for the creation of new wealth.

In *Capitalism, Socialism and Democracy* (1942), Joseph Schumpeter developed the concept out of a careful reading of Marx's thought, arguing that the creative-destructive forces unleashed by capitalism would eventually lead to its demise as a system. Despite this, the term subsequently gained popularity within neoliberal or free-market economics as a description of processes such as downsizing in order to increase the efficiency and dynamism of a company. In *The Communist Manifesto of 1848*, Karl Marx and Friedrich Engels described the crisis tendencies of capitalism in terms of "the enforced destruction of a mass of productive forces".

Modern bourgeois society, with its relations of production, of exchange and of property, a society that has conjured up such gigantic means of production and of exchange, is like the

sorcerer who is no longer able to control the powers of the nether world whom he has called up by his spells. It is enough to mention the commercial crises that by their periodical return put the existence of the whole of bourgeois society on trial, each time more threateningly. In these crises, a great part not only of existing production, but also of previously created productive forces, are periodically destroyed. In these crises, there breaks out an epidemic that, in all earlier epochs, would have seemed an absurdity—the epidemic of over-production. Society suddenly finds itself put back into a state of momentary barbarism; it appears as if a famine, a universal war of devastation, had cut off the supply of every means of subsistence; industry and commerce seem to be destroyed; and why? Because there is too much civilisation, too much means of subsistence, too much industry, too much commerce. The productive forces at the disposal of society no longer tend to further the development of the conditions of bourgeois property; on the contrary, they have become too powerful for these conditions. And how does the bourgeoisie get over these crises? On the one hand by enforced destruction of a mass of productive forces, On the other hand, by the conquest of new markets, and by the more thorough exploitation of the old ones. That is to say, by paving the way for more extensive and more destructive crises, and by diminishing the means whereby crises are prevented.

A few years later, in the *Grundrisse*, Marx was writing of “the violent destruction of capital not by relations external to it,

but rather as a condition of its self-preservation". In other words, he establishes a necessary link between the generative or creative forces of production in capitalism and the destruction of capital value as one of the key ways in which capitalism attempts to overcome its internal contradictions.

These contradictions lead to explosions, cataclysms, crises, in which momentaneous suspension of labour and annihilation of a great portion of capital violently lead it back to the point where it is enabled fully employing its productive powers without committing suicide.

In the Theories of Surplus Value, Marx refines this theory to distinguish between scenarios where the destruction of (commodity) values affects either use values or exchange values or both together. The destruction of exchange value combined with the preservation of use value presents clear opportunities for new capital investment and hence for the repetition of the production-devaluation cycle; the destruction of capital through crises means the depreciation of values which prevents them from later renewing their reproduction process as capital on the same scale. This is the ruinous effect of the fall in the prices of commodities. It does not cause the destruction of any use-values. What one loses, the other gains. Values used as capital are prevented from acting again as capital in the hands of the same person. The old capitalists go bankrupt. A large part of the nominal capital of the society, i. e. , of the exchange-value of the existing capital, is once for all destroyed, although this very

destruction, since it does not affect the use-value, may very much expedite the new reproduction. This is also the period during which moneyed interest enriches itself at the cost of industrial interest.

Social geographer David Harvey sums up the differences between Marx's usage of these concepts and Schumpeter's: "Both Karl Marx and Joseph Schumpeter wrote at length on the 'creative-destructive' tendencies inherent in capitalism. While Marx clearly admired capitalism's creativity he strongly emphasized its self-destructiveness. The Schumpeterians have all along gloried in capitalism's endless creativity while treating the destructiveness as mostly a matter of the normal costs of doing business."

3.2 Joseph Schumpeter's thought

The expression "creative destruction" was popularized by and is most associated with Joseph Schumpeter, particularly in his book *Capitalism, Socialism and Democracy*, first published in 1942. Already in his 1939 book *Business Cycles*, he attempted to refine the innovative ideas of Nikolai Kondratieff and his long-wave cycle which Schumpeter believed was driven by technological innovation. Three years later, in *Capitalism, Socialism and Democracy*, Schumpeter introduced the term "creative destruction", which he explicitly derived from Marxist thought and used it to describe the disruptive process of transformation that accompanies such innovation:

Capitalism is by nature a form or method of economic change and not only can be stationary. The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates.

The opening up of new markets, foreign or domestic, and the organizational development from the craft shop and factory to such concerns as U. S. Steel illustrate the process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in.

In Schumpeter's vision of capitalism, innovative entry by entrepreneurs was the disruptive force that sustained economic growth, even as it destroyed the value of established companies and laborers that enjoyed some degree of monopoly power derived from previous technological, organizational, regulatory, and economic paradigms. However, Schumpeter was pessimistic about the sustainability of this process, seeing it as leading eventually to the undermining of capitalism's own institutional frameworks: In breaking down the pre-capitalist framework of society, capitalism thus broke not only barriers that impeded its progress but also flying buttresses that prevented its collapse. That process, impressive in its relentless necessity, was not