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Schumpeterian Entrepreneur

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The Portrait of the Entrepreneur

The author, J.A. Schumpeter (1934), presents a portrait of this very particular economic agent as follows. Being an entrepreneur is not a profession at all, and certainly not a conventional rule, or even a comfortable state. Very briefly, a person is an entrepreneur if he performs new combinations, even if he is not the creator of the materials of the new combinations (in fact, this is not the most important for the author). J.A. Schumpeter uses also the metaphor of a closed circuit in order to explain that when the entrepreneur loses this specific character, he continues to operate, but only within a circuit created by the company. The entrepreneur could be either a founder or an employee. But the image of a “captain of industry” or a creator seems to be a more consistent concept according to the Schumpeterian entrepreneur.

J.A. Schumpeter (1934) insists on the very specific character of the entrepreneur. He compares the entrepreneur to people who belong to a particular species. The implementation of new combinations is a picky function, a kind of privilege for only a few people who are able to recognize the opportunities of new combinations

and to implement them. This agent has rare qualities such as intelligence, intuition, ability of vision, etc.

J.A. Schumpeter considers that the entrepreneur belongs to the quarter highest group (top 25% group) of the population, and forms a type that characterizes the extent of these outstanding qualities in the sphere of the intellect and the will. The motives of the Schumpeterian entrepreneur are three. He wants first to make his dream come true and he has the will to found a private kingdom. The will of the conqueror is essential. The joy of finally creating a new economic form is a third group of motivation. The entrepreneur should therefore be able to demonstrate a willingness in order to impose the novelty, to “break” the routine. This implies that he is also able to act as a real leader.

What the Schumpeterian Entrepreneur Is Not

J.A. Schumpeter notes that during the nineteenth century, the entrepreneur is defined within the generic term of “management” which means control, hierarchy, or discipline. This observation does not agree with the idea that this management work is too much administrative, or bureaucratic. It means that the entrepreneur is not a kind of intermediary, in the process of economic cycles, between the one who holds the resources and the final consumer. Hence J.A. Schumpeter (1939, 1951) comes to the

conclusion that the source of evolution lies in the supply. In the end, the needs of consumers do not impose their will upon the unit of production. The author considers rather that the producers guide the consumers' needs. But what is important is the focus on the assertion that not just any producer is able to guide the need of consumers, but only a handful of them, namely, the entrepreneurs.

At this stage, it is also important to distinguish between the inventor and the entrepreneur. Generally, the functions of the inventor or the engineer and, that of the entrepreneur do not coincide.

Moreover, the entrepreneur is also distinguished from the capitalist. This distinction allows the author to highlight the importance of credit, and the process of the creation of money in economic development. To summarize, the implementation of new combinations requires the input of resources provided by the banker, the capitalist. Thus the "*bourgeoisie*" plays a crucial role in society in the sense that it offers a kind of shelter for people who want to innovate.

This difference between these roles as economic agents allows then J.A. Schumpeter to go further away from the notion of *knightian* risk (F. Knight 1921) who considers the entrepreneur as a risk taker. In the Schumpeterian vision, it is only the capitalist who bears the risk of novelty.

Entrepreneur, Innovation, and Creative Destruction

The Schumpeterian entrepreneur is also considered as the real cornerstone of capitalism. Within the capitalism system, the development of the economy is considered as a dynamic process. It is important to insist on the fact that this idea of dynamics is quite different according to the mainstream concept of equilibrium. The entrepreneur needs always evolution and of course, it is not possible to consider that his dynamics could be ending because of an ultimate equilibrium point. In other words, the evolution does not cease in order to avoid a regime without innovation.

This dynamics provides a sense of the figure of entrepreneur.

As Schumpeter points out, innovation is the main source of economic development, but the entrepreneur is the real fundamental catalyst of the innovation process. As we have already specified, his function is to perform new combinations. These could be the following possibilities listed by J.A. Schumpeter:

- Manufacture of a new good
- Introduction of a new method of production
- Opening a new market
- Conquest of a new source of raw material
- Creation of a new organization

For J.A. Schumpeter, the essence of the entrepreneur is then the ability to break away from routine, to destroy existing structures, to move the system away from equilibrium. It means that the most important element is not a quantitative evolution of variables but rather a kind of qualitative evolution or mutations which express the dynamics of the process of innovation. The author uses the metaphor of blood inside the body in order to explain the notion of flow within a closed circular.

The entrepreneur is the disruptive force that dislodges the market from the somnolence of equilibrium.

The primary consequence of the Schumpeterian entrepreneur is the importance allocated to the long-run economic development of the capitalist system. This so-called creative destruction is the process of industrial mutation that continuously revolutionizes the economic structure from within, incessantly destroying the old one, continually creating a new one. This process is the essential feature of capitalism and the focal point of the Schumpeterian entrepreneur.

Entrepreneur and Monopoly

This basic principle of creative destruction, which is deduced from the primacy of the entrepreneur in the implementation of innovation, allows the author to explain the nature of profit. Since only the entrepreneur is able to

create a profit from the output of the innovation, it is different in particular from rent, wages, or the normal return on capital.

This distinction is decisive to qualify the link between profit and monopoly. When new products appear for the first time in the market, the entrepreneur has no competitors; their prices are formed, wholly or within certain limits, according to the principles of monopoly prices. Thus, besides the fact that some basic conditions are observed, the entrepreneur grants himself an advantage because he creates a monopoly.

However, this monopoly, and the resulting benefits are not sustainable and lead to a difference between the concept of profit and the gain from a monopoly. This dichotomy between the benefit of the entrepreneur and the return linked to the monopoly analysis prefigures J.A. Schumpeter's vision concerning the disappearance of capitalism due, in reality, to the appearance of sclerotic corporate monopoly because of the lack of entrepreneurial initiatives.

The Obsolescence of the Schumpeterian Entrepreneur

The collapse of capitalism is explained by its own logic (J.A. Schumpeter 1942). In addition to the disappearance of opportunities of investment, which leads also to the disappearance of the shelter of the "bourgeoisie," it is primarily the decline of the function of the entrepreneur which is the cause of the transformation of capitalism into socialism. The only solution for society to survive is to evolve toward a socialist system because of the destruction of the support for the entrepreneur which provides him with the capability to be and to do.

Considering a situation of satiation, the author considers that capitalism, which is essentially an evolutionary process, will be in a situation of atrophy. The entrepreneur would be deprived of any field of activity. The profits and, simultaneously, interest rates will converge toward zero. The layers of bourgeoisies, who live in profits and interest, would tend to disappear. Companies would all lead to bureaucracy.

These ideas summarize the causes and the consequences of the disappearance of capitalism according to the obsolescence of the Schumpeterian entrepreneur.

This destruction of the institutional framework of the capitalist society is accompanied by a destruction of the protective *shelter* provided by the "bourgeoisie." The decay of this class illustrates precisely the breakdown of the defenses of capitalism, including the fact that the "bourgeoisie" is detached from its own values. In this regard, the author considers that faced with the hostility growing around them and then the consequences, in terms of practice legislative, administrative, and judicial, generated by this hostility, entrepreneurs and capitalists – in fact all the social strata who accept the program of bourgeois existence – will eventually stop performing their duties. The growing hostility experienced by capitalism in this respect is the final factor in the process of disappearance.

Size of the Firm and the Schumpeterian Entrepreneur

Two visions of the relationship between the size of the firm and innovation are attributed to Schumpeter. The first, called "Schumpeter Mark I," is developed in *The Theory of Economic Development*. Small firms play a major role in the process of innovation. Entrepreneurs perform new combinations, create new firms. In this approach, only the small business is the vector of technical progress. The second vision, "Schumpeter Mark II," is developed in *Capitalism, Socialism, and Democracy*. Innovation is initiated by large companies with a research laboratory and only the large companies innovate.

Innovation is the engine of economic development, notably for the capitalism. The factor of innovation is the entrepreneur. In this – theoretical – context, since the entrepreneur is no longer the reference, capitalism is led to decline. The main reason for the disappearance of the function of entrepreneur is based on the appearance and development of R&D departments in large firms, a source of bureaucratic

and “routinized” technological progress. The big companies are responsible for the disappearance of the entrepreneurial function and of the capitalism. The emergence of large structures destroys the institutional framework based on small businesses: the process inevitably destroys the economic foundations on which small business enterprises are built.

Conclusion and Future Directions: The Concept of the Manager-Entrepreneur

Since the work of F. Munier (1999a, b), one future direction has been to highlight the concept of manager-entrepreneur.

F. Munier defines a kind of hybrid agent called the “manager/entrepreneur.” The dichotomy of the behavior of manager/entrepreneur is as follows: on the one hand, he takes care of ongoing activities that are more short term, the pursuit of profit and reduction of transaction costs; on the other hand, he tries to mobilize knowledge, to find and develop sources of learning, manage and develop individual and collective skills. This involves a tradeoff between the forms of centralization and decentralization needed to encourage the creation of knowledge while providing a pipeline for new useful knowledge.

The manager/entrepreneur is faced with several dilemmas to simultaneously maintain authority, stimulate creativity, and motivation of individuals. The manager/entrepreneur must solve the tensions between centralization and decentralization, between control and commitment, between change and stability, between order and disorder in the firm.

Centralization is a source of coherence, but also a source of inertia if it seems too heavy. However, decentralization is about creativity, but an extreme situation can cause the disappearance of the organizational structure, thus wiping out all references and codes. To allow the creation of skills in the firm, the manager/entrepreneur must consider both the advantages and disadvantages of each mode of governance.

The concept of manager/entrepreneur leads to the concept of duality of the firm (Munier 1999b)

which provides meaning to the Schumpeterian entrepreneur as the cornerstone of creativity within the firm.

Cross-References

- ▶ [Creative Destruction](#)
- ▶ [Developing Radical Inventions](#)
- ▶ [Entrepreneur](#)
- ▶ [Heroic Entrepreneur, Theories](#)
- ▶ [Individual Determinants of Entrepreneurship](#)
- ▶ [Innovator](#)

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Science of Creativity

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Synonyms

[Creatology](#); [Sozidonics](#)

Definition

The science of creativity is the study of the complex phenomenon of creativity.

Introduction

As with any new field of research, the creativity research at a certain moment of time develops into a science. Creating (structuring, designing) a new science is an act of creativity. If scientists create new methods of research, new models, new hypotheses, new theories, new devices, new experiments, and these are all creative acts, then the creation of a science can be considered one of the largest creative acts in the field of science. In the history of science, the founders of new sciences are often referred to as “fathers,” such as Gregor Mendel, the father of genetics, or Norbert Wiener, the father of cybernetics.

On the ontological level, the humanity as a whole exists, works, and creates newness of all kinds without thinking about creativity. Then there appears a group of thinkers (philosophers, scientists) who detect some patterns in the acts of creation and begin to observe this process and reflect its regularities. This reflection constitutes the gnoseological level – the level of knowledge. After gathering lots of data and creating a few theories, there appears a need to create a science of creativity for the world of creation to become reflected scientifically. The data on creativity gathered by the efforts of hundreds of scientists around the globe becomes the pool for shaping the science of creativity. This is how creativity in science shapes the science of creativity.

From a Field of Research to a Science: Sozidonics or Creatology

Millenniums of technological inventions, poetic and artistic explorations that resulted in cultural masterpieces, scientific discoveries, and theoretical breakthroughs had to be scientifically explained. Creativity, the most human of all

human abilities, called for explanation. During the last century, scholars researched:

- Relationship between creativity and intelligence
- Neurological processes associated with creative activity
- Creative abilities
- Genetic factors versus training in creativity
- Correlation between creativity and personality types
- Relationship between creativity and mental health
- Educational methodologies and human potential for fostering creativity
- Educational applications for improving the efficiency of learning
- Technological augmentations of creative abilities
- Creativity boosters and creativity squelchers
- Effect of chemical substances on creativity
- Relationship between teaching creativity and recidivism reduction
- Top creative achievers (genius), etc.

The list of scholars who contributed to the development of science of creativity is so long that it goes well beyond the references pattern of this encyclopedia. Nevertheless, at least mentioning the names of the most prolific ones is a must to give them credit for their dedication and enormous work. Often their scientific work is “irretrievably interwoven,” as Sidney G. Roth (1963) says, with education and training, but they still find time to do their research. Here are the names of these heroes of science whose creativity in science builds the science of creativity (in alphabetic order): T. M. Amabile (Componential Model of Creativity, Consensual Assessment), G.S. Altshuller (TRIZ), J. Arnold (Useful Creative Techniques), M.S. Basadur (Creative Problem Solving in Business, Simplex), B. Bleedorn (Education Track for Creativity), T. Buzan (Mind mapping, Everyday Genius), B. Crammond (Creativity in the Future), M. Csikszentmihalyi (Creativity: Flow), G. Davis (Creativity is Forever), E. De Bono (Serious Creativity), I. Dubina (Creativity as a Phenomenon of Social Communications), G. Ekvall (Creative Climate), R. Epstein (Behavioral Approaches to Creativity, Generativity Theory), F. Eysenk

(Genius: The Natural History of Creativity), R. Firestien (Leading on the Creative Edge), M. Fisher (The IdeaFisher), R. Florida (The Rise of the Creative Class), S. Freud (Creativity and the Unconscious), H. Gardner (Creating Minds), M. Gelb (How to Think Like Leonardo da Vinci), W. Gordon (Synectics), K. Goff (Everyday Creativity: an Easy-to-Read Guide), J.K. Gowan (Right Hemisphere Imagery), H.E. Gruber (Systems Approach to Creative Work, Creativity and Human Survival), S. Gryskiewicz (Positive Turbulence), J. Guilford (Intellect Model), N. Hermann (The Creative Brain, HBDI), D. Horth (Creative Competencies for Contemporary Leadership), S.G. Isaksen (Creativity Model, CPS, Frontiers of Creativity Research), M. Kirton (Styles in Creativity and Problem Solving, KAI), P. Kline (The Everyday Genius), A. Koestler (The Act of Creation), L. Kubie (Neurotic Distortion of the Creative Process), I. Magyari-Beck (Creatology), A.H. Maslow (Towards a Psychology of Being), J.H. McPherson (Creative Problem Solving Methods), M. Michalko (Cracking Creativity, Thinkertoys), M. Murdock (Nurturing and Developing Creativity), K. Neethling (Whole-Brain Sexuality, South African Creativity Foundation), R. Noller (Creativity Formula), V.M. Odrin (Morphological Synthesis), A. Osborn (Creative Problem Solving, Brainstorming, Creative Education Foundation), S.J. Parnes (Creative Problem Solving, Creative Education Foundation, Magic of the Mind), K.H. Pribram (Brain and the Creativity Act, Languages of the Brain), G. Prince (The Practice of Creativity), S. R. Pritzker (Encyclopedia of Creativity), G.J. Puccio, (Buffalo Creative Process Inventory, etc.), M. Runco (Theories of Creativity, Encyclopedia of Creativity), D.K. Simonton (Creativity, Eminence, Genius, Darwinian Approach, Historiometry), M. Stein (Stimulating Creativity, Creativity and Culture), R.J. Sternberg (The Nature of Creativity), E. P. Torrance (Torrance Test of Creative Thinking, Torrance Kids), D. Treffinger (Creativity Definitions, Creative Thinking), A. Van Gundy (Idea Power, Organizational Creativity and Innovation), R. von Oech (Creative Think), G. Wallas (The Art

of Thought), W. Wenger and S. Wenger (Project Renaissance), M. Wertheimer (Productive Thinking), F. Zwicky (Morphological Analysis), and many others (see ► [Research on Creativity](#)).

Their research and publications show that the advent of the science of creativity was actually predetermined. The only variables were when, where, and by whom?

Origin and History of Research

It is generally accepted that research on creativity started with G. Wallas' work in which he dissected the act of creativity into four stages: preparation, incubation, illumination, and verification (Wallas 1926). Prior to this publication, creative people were referred to as "marked by God"; no explanation was given either by these people or by researchers on how creativity appears, how it develops, how it works, etc. Some brilliant insights on the issue were scattered and were so insignificant that they can be considered only some kind of pre-research.

The next major advance in igniting interest to topic happened thanks to J.P. Guilford's famous speech for the American Psychological Association in 1950, in which he called for action on the sorely neglected area of creativity research (Guilford 1992).

Dr. Sidney Parnes, one of the co-founders (with Alex Osborn) of Creative Problem Solving (CPS) (see ► [Creative Problem Solving](#)) and Creative Education Foundation (CEF), Buffalo, NY, sketched the following periods in the development of creativity research domain:

- 1940s – cry in the dark
- 1950s – the hope and hunch stage
- 1960s – the research, replication, and report stage
- 1970s – the widespread application stage
- 1980s – the mainstream application stage (Parnes 1992)

This sequence of stages vividly shows the formation of applied science, i.e., research going together with practice and returning to practice immediately. These first steps provide the foundation for building a science.

Trends and Approaches

The history of science in general demonstrates three major approaches in creating sciences:

- Bottom-up
- Top-down
- Cross-section

The bottom-up approach happens when a researcher discovers something so unusual and important that it later leads to unveiling a new field of research built on this discovery. Typical examples are Gregor Mendel who discovered and described similarities in bean coloring generation after generation (later he was considered the “father of genetics”) and Wilhelm Conrad Röntgen who discovered x-rays in 1895 and thus “fathered” the field of radiology.

The second type, the top-down approach, occurs when somebody generalizes the huge amount of data under one concept. Good examples are the general systems theory by Ludwig von Bertalanffy (1968) and cybernetics by Norbert Wiener (1948).

The third type, the cross-section approach, happens when a scientist works at the borderline of two sciences and proves that there is a field of research between the two. A bright example is Hermann von Helmholtz who mastered two disciplines (medicine and physics) and with his synthesizing approach to science is now considered to be the “father of biophysics” (the cross-section between biology and physics).

In the field of creativity, there is no groundbreaking discovery of one fact, but there is a huge amount of data to generalize. Therefore, it is obvious that the science of creativity is being developed by the top-down approach. However, since it deals with other sciences and is derived from the other fields of research, the process has the features of the cross-section (interdisciplinary) approach.

In addition to the approaches mentioned above, there are trends in development of the concept. The major trends in the development of the creativity concept are:

- From exclusive to inclusive
- From nonscientific (popular) to scientific

The trend from exclusive to inclusive means that the ability to create was first ascribed only to God and the true creation was only from nothing to something (exclusive). Later in history, the ability to create was ascribed to poets, then to artists, then to actors, and so on and so forth to include actually everybody (inclusive).

The second trend means that researchers move from explaining creativity to the public in popular terms (just for the public to know what it is to apply it to business, education, etc.) to scientific reflection that may be less popular or less understood but more adequate and more precise in nature.

Trends and approaches explaining creativity are best seen in the search of proper definitions (see ► [Creativity Definitions, Approaches](#)) and theoretical models of creativity.

Conceptual and Graphic Models

After Wallas, mentioned above, there appeared many other models. In 1968, McPherson conducted a comparative analysis of 18 models and presented them in one table. These models included two to eight stages (McPherson 1968).

The first models were simplistic and gave little in defining the operational steps. As a response to the practical needs, there appeared operational models. One of the most famous operational models belonged to Alex Osborn and later was improved by Sid Parnes and is now known as Osborn-Parnes model.

Quite popular are graphic models:

- The 4 Ps model picturing creativity as intersection of *People*, *Process*, *Product*, and *Press* (Isaksen 1987)
- The Torrance’s model showing creative behavior as a mix of abilities, motivation, and skills (see ► [Creative Behavior](#))
- The Amabile’s componential model depicting creativity as an intersection of expertise, creativity skills, and task motivation (Amabile 1997)
- The divergent/convergent thinking model consisting of splitting and then converging arrows (see ► [Convergent Versus Divergent Thinking](#))

- The two-stage “great idea” dynamic model that showed diverging from the beaten path to a great idea and then applying this idea (Davis 1981)
- The five-stage dynamic creative act model that depicted a new result as well (Aleinikov 1989) that paved the way to Creative Pedagogy (see Aleinikov 1990a, 1991, ► [Creative Pedagogy](#))
- And many others (see ► [Multiple Models of Creativity](#))

An original approach was offered by G.P. Guilford whose graphic model of intellect (box) included divergent/convergent thinking (Guilford 1968).

The development of conceptual and graphic models for creativity, creative acts, and creative problem solving is going on and contributes to the new science of creativity. However, a major theoretical breakthrough was needed to create the science itself.

The New Science’s Place in the Classification of Sciences

The new science of creativity has to belong to the field of social sciences that study human behavior and societies, as opposed to natural sciences, like physics and chemistry, and formal sciences, like mathematics and logic.

Within the social sciences, the science of creativity is grounded in psychology, most closely related to education (see ► [Creative Pedagogy](#)), linguistics (see ► [Creative Linguistics](#)), and certainly related to anthropology, archaeology, history, sociology, and other sciences.

Historically, the science of creativity, like all other sciences, started as empirical research (that continues all the time), got through the stages of experimental research and separate theories (see ► [Creativity, Experiential Theories](#)), and now is in its theoretical design stage that crowns the formation of the science.

During this formation, one has to remember that social sciences are much younger than natural and formal sciences that were established centuries ago. That is why in the process of creating a new science, the well-established

sciences can be viewed as examples to follow or sources for borrowing the concepts and methods of research.

The Science of Creativity

As all well-established sciences, the science of creativity has to have the following elements:

- Name
- Objective
- Subject of study
- (New) vision of the subject (definition)
- Classification
- Model of the subject
- Special methods of research
- Units and measurements
- Results (some practical applications that illustrate the power of the theory)
- Predictions

So the task is either to find them or formulate them.

Name for the New Science

There are two candidates for the name of the science of creativity: creatology (Aboganda and Cortez 1972, Magyari-Beck, 1977–2008) and sozidonics (Aleinikov 1994).

Creatology

The term creatology consists of two roots derived from Latin *creō*, *creatus*, the past participle of *creare*, meaning *to make, bring forth, produce, beget* plus *logy* coming from *logos* meaning *word, the study of*.

The Psychology Wiki site states, the term Creatology, as a new science of creativity, was first used by Rafael Nelson M. Aboganda and Ricardo S. Cortez in a paper entitled “Towards a Positive Understanding of Creativity – Creatology: The Science of Creativity” published in October 1972 by the Philippine Inventors Commission (PIC), now Technology Application and Promotion Institute (TAPI) an agency of the Department of Science and Technology (DOST), in the Philippines.

Creatology was later introduced and proposed by a Hungarian scholar Dr. Istvan Magyari-Beck

in his presentation “About the Necessity of Complex Creatology” made on the International Sociology of Science Conference in Budapest, in 1977. In 1979, this paper was published in the book *Sociology of Science and Research*, edited by János Farkas, Akadémiai Kiadó, Budapest, pp. 175–182.

Dr. Sayed Mahdi Golestan Hashemi (Founder and Head of Iran Research Center for Creatology and International Center for Science of Creatology) is developer of Creatology as an interdisciplinary (GTC): Creatology is Scientific Study of various aspects of Creativity, Invention and Innovation by different approaches. Creatology has many sub-disciplines such as:

- Analytical Creatology
- Psychological Creatology
- TRIZ-based (TRIZical) Creatology
- Inventology
- Bionical Creatology”

Retrieved from [http://: psychology.wikiw.com/wiki/Creatology](http://psychology.wikiw.com/wiki/Creatology) psychology.wikia.com/on February 4, 2012.

It was Dr. Magyari-Beck’s article titled “Creatology” in the *Encyclopedia of Creativity* that made the term popular (Magyari-Beck 1999). In 2008, Dr. Magyari-Beck also published an article titled “Creatology from 1977 to 2007” in the *Society and Economy* journal that summarized 30 years of concept development.

Sozidonics

The term sozidonics was published first in English in 1994 (Aleinikov 1994).

It is related to a Russian word *созидание/sozidanie* that has only one meaning “*creation of positive things*” – a very rare case in the language because usually words have several meanings. This word has a neutral variant *создание/sozdanie* with the meaning *creation* that can be used for both positive and negative things. The prefix *co-/so-* means *together*, like *co-* in English. The root of the word *-зида(-зда-)/-зьдъ/-zida (zda)* is a Proto-Slavic root “*zida*” *clay* (not used separately anymore), but seen in Russian words *здание/zdanie (building)*, *зодчий/zodchiy (architect)*, Bulgarian *zid*, Serbo-Croatian **zидъ/-zid*, and Romanian *zid* in the meaning *wall*.

The final part of the term *sozidonics* is usual for sciences and may be seen in *mathematics*, *cybernetics*, *bionics*, *genetics*, etc.

The etymological connection here is obvious: *so-zid* means building together, like in creativity, something is created for the benefit of others. Clay as the building material was certainly used for house walls, church walls, and town walls. Going back into history, clay hypothetically might be the first material that could provoke a primitive human mind for a creative act. Clay’s plasticity when wet and ability to harden when dried might have sparked an ancient human to create some objects or even first sculptures out of it. Ceramics started from clay pieces dropped in fire. As opposed to clay sculptures, wood carving and stone sculptures would have required much more elaborate tools and techniques, which place them much later in the history of arts and crafts (Aleinikov 1994).

Comparison

The term creatology is more traditional. It is coined from the well-known Latin roots and easily understood. This advantage, however, can turn into disadvantage: it makes it prone to parallel usage in technology and marketing which overshadows the scientific meaning and usage. For example, the Google search on “*creatology*” delivers hundreds of items *not* related to the science of creativity, like *Creatology™ coloring poster*, *Creatology™ 3D Kits*, *Creatology Wooden Puzzle*, *photo of Creatology®*, *Creatology Doll Furniture*, *Creatology Wooden Temple of Heaven review*, *Creatology: an experimental blog coupling creativity and science...*

Obviously, this word, registered and trademarked, is widely used for technologically based toys as well as for experimenting. As a result, after some time, it may look like creatology as a science of technological advances of the company called creatology. Also, most importantly, what was supposed to be a term (a word with one meaning) has become a usual word with numerous meanings and, therefore, has stopped being a term.

Finally, according to the founders, the word creatology is used for the science of creativity,

invention, and innovation. So it is *not* the term specifically for the science of creativity.

The term *sozidonics*, on the contrary, is nontraditional. It has the following advantages: First of all, it is a term, not a usual word: it has one sound (or graphic) form related to one meaning. Second, etymologically, it relates to the first creative acts in the past. Third, it refers to positive and only positive creativity (as it should be in the ideal!). Fourth, it sounds original (not boring, not traditional) as the term for the science of creativity implying *originality* should be. Finally, what is most important, it precisely names the science of creativity, *not* the science of creativity, invention, and innovation.

The issue may be resolved after analyzing the subjects of study covered by creatology and sozidonics (see below). History will make the final selection.

Objective of the Science of Creativity

Since science (from Latin *scientia*, “knowledge”) in general is the activity of building and organizing “knowledge in the form of testable explanations and predictions about the universe,” the objective of the science of creativity is to build and organize knowledge about creativity.

Creativity as a Subject of Study

The main task for the researchers shaping the science of creativity is to define the volume of the concept, i.e., to place it where it belongs. A theorist of science has to determine the most probable place between the two extremes: maxi-creationism (longing for eternity) and mini-creationism (longing for zero).

The first one states that creativity is everything and everywhere. God (nature) created universe, so God (nature) is creative. Atoms create molecules, molecules create organisms, organisms create psyche and societies, psyche creates reflection and reflections of reflections (knowledge), etc. So God (nature) is creating and recreating the universe and its own reflection; the science of creativity, therefore, has to study everything (∞).

The opposite approach states that creativity is a very specific (extremely short, like a flash) moment that happens in the mind of an individual

Science of Creativity, Table 1 Creatology and its subsience domains

Science name	Creatology = the science of		
Subject studied	creativity, invention, & innovation		
Subsience name	?	Inventology	?
Sub-subject studied	Creativity	Invention	Innovation

(or God). So, actually, there is nothing (0, zero) or a close-to-nothing moment to study.

The majority of scientists are somewhere in between, but here begins the heated discussion on where creativity belongs and how it is separated from all the other concepts like imagination, innovation, invention, etc. (see ► [Nature of Creativity](#)).

The analysis of creatology concept makes it a good example. As it is seen from the blog text cited above, creatology claims to study various aspects of creativity, invention, and innovation. Thus, the subject of creatology is not only creativity but also invention and innovation. Since creatology founders also offer a separate science for studying inventions, the structure of the subject and sub-subjects claimed to be covered by creatology (as mentioned above) looks like [Table 1](#).

If the name inventology is offered for the study of inventions (one of three subsiences), then the question marks in the [Table 1](#) indicate the absence of specific names for the science of creativity as well as for the science of innovation.

Research shows that Russian scientists introduced the science of innovation, called *Иноватика/Innovatica* (or better *innovatics*) in 1980–1990s. There are departments of innovatics at some universities. Books on innovatics are published (Poskryakov 1988). Obviously this term and this science fit the structure of domains depicted in [Table 1](#) and fill the empty cell on the right.

With the innovation domain covered by innovatics, the only subdomain left uncovered is that of creativity. *Sozidonics*, described above as the science of creativity specifically dedicated to this (and only this) subject, meets the need and can be placed in the left empty cell.

Science of Creativity, Table 2 Creatology, sozidonics, inventology, and innovatics

Science name	Creatology = the science of		
Subject studied	creativity,	invention, &	innovation
Subscience name	Sozidonics	Inventology	Innovatics
Sub-subject studied	Creativity	Invention	Innovation

The terms added to Table 2 are in bold

In this case, the structure of sciences covered by creatology could look like that in Table 2.

New Vision of Creativity

Dr. Magyari-Beck in his article “Creatology” states that “the word creativity has already lost its previous, merely linguistic meaning and has gradually acquired a position of a new scientific term which should be defined in a new and much larger way within its own frame of reference” (Magyari-Beck 1999). Then there follows the reference to the article *Definitions of Creativity*, which offers no definitions of creativity at all.

The article on creatology does not offer any new vision (new definition) of creativity either.

Sozidonics has to fill the gap.

To help people visualize the place of creativity as a phenomenon and the new vision of creativity, here is the explanation and the logic behind it.

Big Picture

The new vision, or a new approach to creativity, is a top-down approach, i.e., a theoretical approach rather than empirical one built from bottom-up. It starts from the vision of nature as a whole.

Nature, whether it is the creation of God or a self-developing entity, is an everlasting process of newness production. Humans are both the largest producers and the largest consumers of newness: new products, new events, new presidents, new movie stars, new tragedies and comedies, new discoveries and mistakes, new...new...new....

Since newness is everywhere in nature, it makes for a huge object of study, and the task of a researcher is to discover the general mechanism of newness production, to classify this newness, to find the laws of newness production, and to

find the ways of predicting the future development. Novology (see ► [Novology](#)), the science of newness, does this (Aleinikov 2002b).

There are five main, easily identifiable levels of organization in nature and, therefore, five levels of newness: physical (particles, rays, atoms), chemical (molecules), biological (cells and organisms), psychological (self-reflecting, or psyched organisms, called individuals), and social (societies). Numerous sublevels are available within every level, but this is beyond the scope of this article. These levels are interconnected and interdependent. When placed in the hierarchical order, they look better like this:

5. Social (societies)
4. Psychological (organisms with psyche, individuals)
3. Biological (cells, organisms)
2. Chemical (molecules)
1. Physical (particles, atoms)

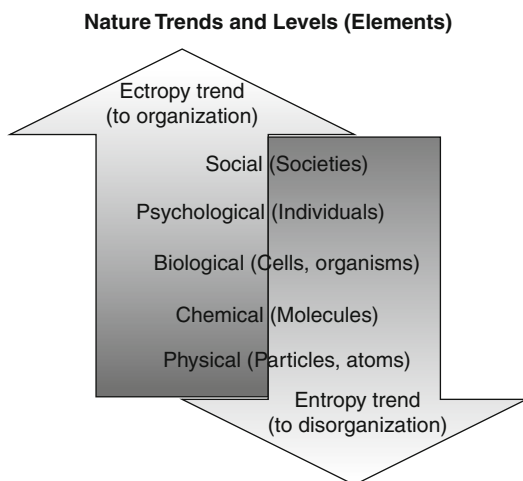
One essence unites all these levels. This is order or organization as a state. Obviously, the higher the level, the more organized it is (because it incorporates the organization of the previous level and adds its own organization) and vice versa: the lower the level, the less organized it is. The movement from the lower level to the higher level is called ectropy (the trend to higher order, the process of organization), while the movement to the lower level is called entropy (the trend to lower order, the process of disorganization).

The trends, levels, and elements of nature development are shown on Fig. 1.

Creativity definitely belongs to the ectropy trend on the psychological level (level 4, Fig. 1), while innovation belongs to the social level (level 5, Fig. 1). **Creativity is the production of newness (new order of things and processes, new organization), while innovation is the consumption of this newness by the society.**

However, creativity is not just production of newness but the process of accelerated newness production. The point is that new images, new emotions, new thoughts, new associations, etc., exist in the everyday life of every individual. This is *not yet* creativity. This is the natural speed





Science of Creativity, Fig. 1 Trends, levels, and elements of nature development

psychological life. Only when this natural process gets accelerated, and as a result, new ideas, new thoughts, new products are produced faster than is considered natural, then people call the person doing it “creative.”

Therefore, the scientific definition of creativity is the following: **creativity is a human activity of accelerating the natural process of organization and/or decelerating the natural process of disorganization**, or even shorter: **creativity is a human activity of accelerating organization and/or decelerating disorganization** (see ► [Creativity Definitions, Approaches](#)).

In everyday life, the organization processes are called birth, growth, development, etc., while the disorganization processes are called decline, decrease, withering, death, disintegration. Any entity in the universe, including universe itself, has its birth, development, peak of development, and then decline and death.

The following figure illustrates the essence of creativity.

Notice how [Fig. 2](#) shows that at a certain moment of time (T_1 or T_2), the organization level O_1 (accelerated development) of any entity is higher than O_2 (natural speed development), and the organization level of O_3 (restoration, repairing to decelerate the decline) is higher than O_4 (natural speed decline).

Business people, trainers, consultants, and engineers favor this scientific explanation of creativity because now they request funds for *better organization*, for *faster processes*, and for *accelerated production* (not just for creativity training that looks “fluffy” to some managers and corporate leaders).

On a bigger scale, society needs individual creativity for *better organization* of the society. Moreover, the society (country, state, city, business, educational institution, etc.) that encourages creativity and provides training in creativity increases the creative output of its members and thus is developing (to better organization) in an *accelerated manner*, i.e., faster.

Examples are convincing:

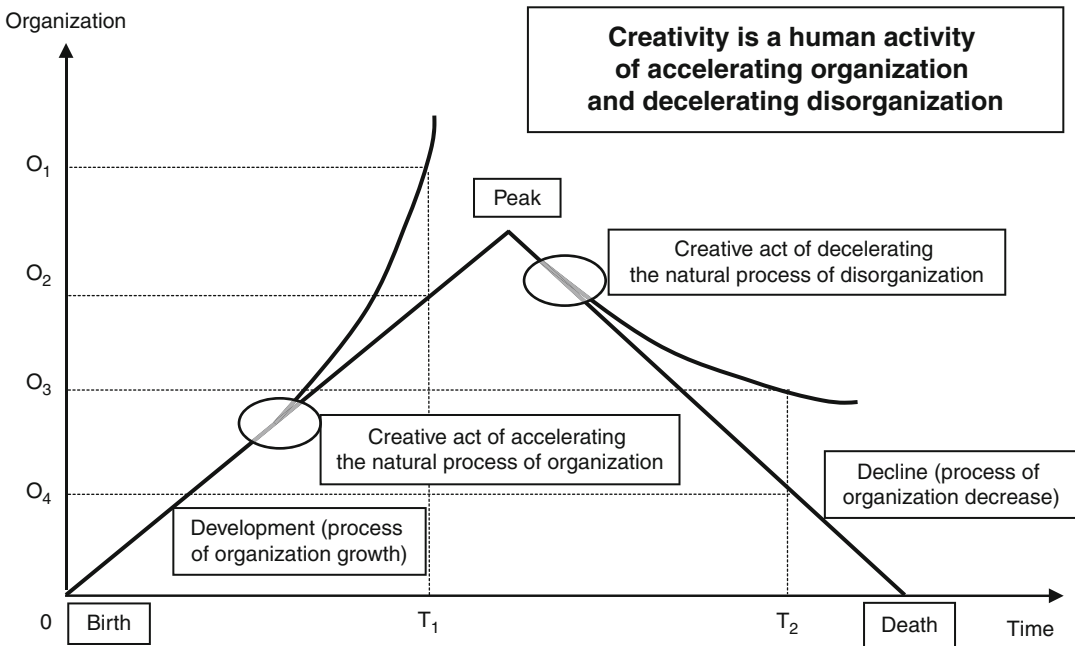
- The Soviet Union (and socialist bloc) was *not* allowing the flow of information, restricted freedom of speech, excluded the free market business relationship, expanded bureaucratic control, eliminated patenting (technological creativity), minimized royalty for creative output in arts, and thus slowed down the society development, began to fall apart, and finally disintegrated (to lower organization).
- Democratic societies, on the contrary, allow more creativity in all spheres of life thus encouraging creative output from individuals, and therefore, these societies gain better technology, better results in sports, medicine, and social activities, and finally climb to *better organization*.

This explains why and how democracy wins over all other political systems and certainly over dictatorships. Creativity – the accelerator to better organization – is the key to faster development!

Sozidonics, the science of creativity, explains not only what creativity is but also how it influences the accelerated development of the society.

New Models of Creativity: Strive for Universality

The new science of creativity needs a model of creativity that is applicable to all domains, all levels, styles, types, and kinds of creativity. It has to reflect the smallest creative act (like a speech act) and the largest creative act,



Science of Creativity, Fig. 2 The essence of creativity

like a discovery. Even God’s act of creation (not to mention all the other human acts) should be reflected by the model. Universality is the #1 requirement for science. Repeatability and testability are #2 and #3, respectively.

Analysis of available creativity models demonstrates that they miss one greatly important aspect: all ideas/solutions/decisions have to be expressed, i.e., pronounced, written, performed, sculptured, painted, etc. The system of expression has to be in the model. It may be a language system or any other system of signs, but it has to be material to represent the ideal idea/solution/decision. Otherwise, neither the simplest idea nor the most complex solution can be transferred to others or, in the final run, even detected.

In everyday life, an idea should be worded, voiced, articulated, written, jotted down, and scribbled. In case of the top-level creative achievement, the genius idea should be expressed in some semiotic system, the system of symbols, and then published, exhibited, and publicized. Whether it is a formula, a theory, a discovery, a melody, a painting, a sculpture, or a pedagogical

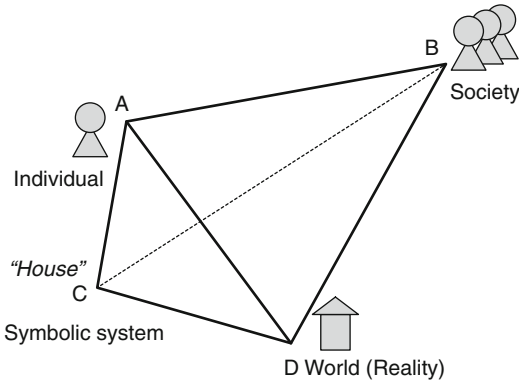
approach, it must be expressed in a system of signs (see ► [Genius](#)).

With this element added, the creative act situation becomes a particular case in the universal state of order reflected by the universal model of sign, language, language awareness, speech and heuristic acts, first developed in 1977 and then adapted for creative linguistics (see ► [Creative Linguistics](#) and Aleinikov 1988a). This is a four-sided model in 3D (Aleinikov 1985; 1988b).

The universal model of sign, language, speech act, and heuristic act looks like [Fig. 3](#).

In general, as [Fig. 3](#) shows, an individual (A) is the person who creates a vision of the world (D), expresses it in symbols of the system (C), and sends it to the society (B). Society is understood as any person, or persons, speaking the same language or using the same semiotic system. The message (AB) is received by the society (B), evaluated, and appreciated or not appreciated.

The real human mind in the process of thinking/creating may run over this model in different directions: from A to B, from A to D, from A to C, from C to D, from D to B, from C to B, and in all



Science of Creativity, Fig. 3 Universal model of sign, language, language awareness, speech and heuristic acts

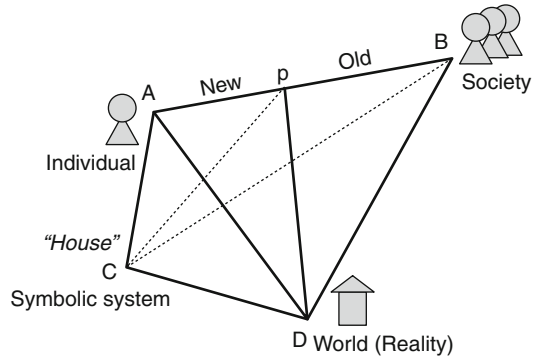
directions back. The human mind may do it several times, loop after loop, before delivering the message (AB), but invariably in any speech and creative act, there will be the reflection of all four absolutely necessary (universal) elements:

- Who (A, individual, sender, creator)
- To whom (B, society, receiver, evaluator)
- What (D, world, vision of the world)
- Expressed by what (C, symbolic system)

Here is the test:

- A fine artist or a sculptor (A) expresses his unique vision of the world (D) in his/her personal manner (C) and shows it to public (B) that evaluates it.
- A scientist (A) finds a new fact, process, regularity of one's field (D), writes an article in scientific terms (C), and sends it to the publisher (B) for publication.
- A teacher (A) creates a new method of teaching in education domain (D) and makes a report (C) for her colleagues (B).
- An actor (A) in his/her specific manner (C) performs a role in a play about the world of love (D) on stage for spectators (B).

In the particular case of a genius (top creativity level), the message (AB) is so uniquely expressed in a symbolic system (C) and reflects such a highly innovative vision of the world (D) that it is top-valued by the society (B). That is why this individual (A) is named a genius (see ► [Genius](#)).



Science of Creativity, Fig. 4 The new/old plane in the model

Notice how the pattern repeats itself in the explanations above. It is exactly what science is: it provides testable and repeatable knowledge.

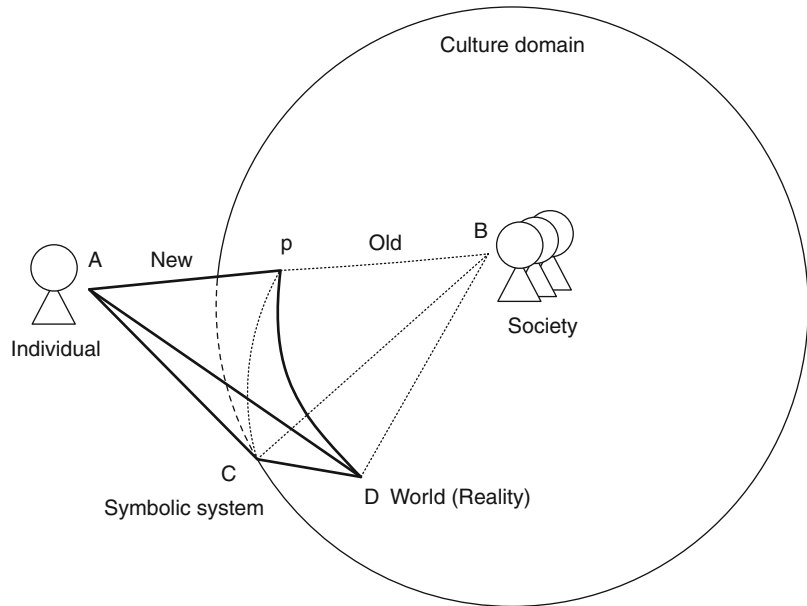
The next issue to address here is how much newness is expressed by the individual (A) for the expression (AB) to be evaluated by the society (B) as low creative, quite creative, or highly creative.

For this purpose, the model contains a special plane that cuts the old and the new in the message. The cutting plane (CDp) looks in general like [Fig. 4](#).

As is illustrated by [Fig. 4](#), any creative act (statement, report, article, book, research, painting, show music, theatrical performance, etc.) consists of the old (BCDp) and the new (ACDp) parts. In the case of everyday creativity, this newness part is smaller. In the case of theater performance, conference presentation, or gallery show, this newness part should be bigger. In the case of genius, this "new" part (what genius has discovered and now communicates to the society) is much larger than the "old" part (what society already knows).

The model of interaction between the individual creator and the society with its culture in general looks like [Fig. 5](#).

As [Fig. 5](#) demonstrates, an individual (A), who discovered, found, invented, thought up, learned something new, or in other words created a new vision of the world (D), has to pack this new vision into an acceptable code (language)

Science of Creativity,**Fig. 5** Model of creative act expanding culture

or express it in some symbolic system (C) also known to the society (B) and then sends a message (AB) consisting of known volume (pBCD) and also new volume (pACD) that is expanding the volume of culture (knowledge, experience, customs, beliefs, etc.). This is the modification of the figure published first in the article titled “Humane Creativity” (Aleinikov 1999a).

This model of creative act is universal, repeatable, and testable. It works for any creative act (including God’s creation), and it also promotes deeper analysis of the creativity act, as systems’ organization levels (function, substance, structure), coding planes, and so on when needed (see ► [Creative Linguistics](#)). It permits profiling newness (see ► [Novology](#)) and picturing genius results (see ► [Genius](#)).

Classification of Creativity

In addition to traditional classification of creativity as artistic creativity, technological creativity, scientific creativity, etc., which follows the domain of human activities, sozidonics offers a new classification that is based on the described above five levels of nature organization.

Sozidonics differentiates the following types of creativity:

- Existential (how to exist physically, how to survive)
- Communicational (how to relate, to communicate, to interact)
- Instrumental (how to develop tools, new organization)
- Orientational (how to select the social goals and objectives, where to use the tools)
- Innovational (how to implement the found newness)

This new classification allows sozidonics and geniusology that stemmed from it to detect new types of geniuses, or in new science terms, “the most powerful accelerators to better organization” (see ► [Genius](#)).

Units and Measurements for Measuring Creativity

Measuring human mental characteristics in general is quite popular. Some websites list about 4,000 commercially available tests. Measuring creativity is a significant part of it (see ► [Measurement of Creativity](#)). As Gerard Puccio, the Head of the International Center for Creativity

Studies, Buffalo, NY, states, “since 1950 researchers have developed an array of formal methods for measuring creativity” (retrieved from <http://www.acsu.buffalo.edu/~stferry/> March 6, 2012). It can be measured by self-assessment, aptitude, and ability tests; by interviews and observations; by rating scales in peer, parent, and teacher rating/nomination; by products created; by awards (recognition), etc.

According to the above-mentioned Isaksen’s model of creativity, there are 4 P’s that can be measured: person, process, product, and press (environment pressure).

- Just to mention a few that assess the *person*: Creativity Attitude Survey, Creativity Tests for Children, Creative Behavior Inventory, Khatena-Torrance Creative Perception Inventory, Myers-Briggs Type Indicator, Hermann Brain Dominance Instrument (HBDI) by Ned Hermann, Neethling Brain Instrument by Kobus Neethling, etc.
- The most well known among measurements that address the *process* are Buffalo Creative Process Inventory (by G. Puccio) and Kirton Adaptation-Innovation Inventory (KAI).
- The instruments that assess characteristics of creative *products* include Consensual Assessment Technique and Creative Product Semantic Scale.
- One tool that assesses the *press* or the climate for creativity and innovation is KEYS (originally called Work Environment Survey) developed by the Center for Creative Leadership.

According to the Creatology Matrix, introduced by Magyari-Beck, it is the abilities, process, and product of the person, group, organization, and culture that need to be measured. In 1990, A. Aleinikov designed the ALEANDR creativity test battery that measured individual and group creativity at the same time (Aleinikov 1990).

The most well-known system of evaluating creativity as **ability** is the Torrance Creative Thinking Test (Torrance 1986). This test presents some tasks to people and then rates their abilities. Longitudinal research is possible with such an approach, and Dr. Torrance made a colossal

effort to follow up his “Torrance kids” for 50 years (see ► [Creativity Tests](#)).

Another well-known system of evaluating creativity that measures the **style** of creativity (not **level of abilities**) and differentiates “innovators” (tending to change the system) and “adaptors” (tending to preserve and improve the system) with “bridgers” in between is called the Kirton Adaptation-Innovations Inventory, KAI (Kirton 1994) (see ► [Adaptive Creativity and Innovative Creativity](#)).

Despite numerous attempts to measure various aspects of creativity, there is still no such a thing in creativity research as unit of measurement, like meter, second, gram, Ohm, Hertz, or Volt in physics, like parsec in cosmology and byte in cybernetics.

The presence of units in this or that field of research to some extent shows whether it is a science or not. Qualitative units and quantitative units of measurement are a must. Measurements are the foundation of any science.

Therefore, in general, when transforming the creativity research field into the science of creativity, one has to move from general measurements to specific measurements and from empirical measurements (often commercial use oriented, used for testing and training purposes) to theoretically based measurements.

With the development of the new vision of creativity and new definition of creativity that emphasize the acceleration to higher organization (discussed above), sozidonics developed a new measurement system and a new unit that measures the efficiency of creative output, i.e., the number of ideas per second. The new unit of measurement established as 1 idea per second is called Alein just as in physics, 1 cycle per second is called Hertz.

This measurement allows researchers not only to evaluate individual performance but also objectively to evaluate the creative power of methods that boost creativity.

Illustration

Case A. Alex Osborn mentioned that brainstorming allowed people to generate 90 ideas in one and a half hours (Osborn 1953). Truly,

brainstorming is the most famous technique in the creativity enhancement market; it made history!

Case B. Max Fisher many years later offers a new “revolutionary” (as he claims) method “IdeaFisher” in the book with the same title *IdeaFisher*. This is how it is described, “Those without the list (of words) only worked an average of 55 min, when they “ran out of ideas.” Those with the list worked an average of 78 min – a 42% increase. There was also a statistical difference in the number of ideas. Those without the list produced an average of 55 ideas. Those with the list produced an average of 86 ideas – an increase of 56%” (Fisher 1996).

Comparison

Calculation shows that the efficiency of creative output in the brainstorming session in *Case A* equals 1 idea/min (90 ideas/90 min).

The efficiency of creative output in *Case B* (without lists) is exactly the same as in brainstorming (*Case A*): 1 idea/min (55 ideas/55 min). The efficiency of creative output in the session with the lists is 86 ideas divided by 78 min = 1.1 ideas/min.

So when the author states a 42% increase in time of work and 56% increase in idea output, these are calculations in absolute numbers. The result looks good and may sound “revolutionary.” However, in objective calculation (new measurement), using the concept “specific creativity,” the increase in creative output efficiency is only 10%, (1.1 vs. 1). This result is quite far from “revolutionary” – not 10 times (1,000%) or 100 times (10,000%) increase.

If calculated in new units, the creative output efficiency of brainstorming is 1 idea/1 min = 1 idea/60 s = 0.017 Alein, and the creative output efficiency of IdeaFisher is 1.1 ideas/60 s = 0.018 Alein. The word “revolutionary” is certainly out of context here.

The introduction of the new type of measurement made it possible to compare the generative power of techniques, methods, and methodologies for boosting creativity and finally led to the development of methods delivering

1,000 ideas/min (kilocreativity), 1,000,000 ideas/min (megacreativity), and more (Aleinikov 1999b, 2002a). Teaching these methods allows human beings (whether children or adults) to overcome the generative power of natural genius (about 100 ideas/min = 1.8 Alein) 10 times and even 10,000 times.

This is how the new scientific approach expanded the natural human creativity power.

Practical Applications of the Science of Creativity: Improving and Accelerating the Existing Results

The formation of the new science of creativity is worth doing only if it leads to outstanding results, only if it shows a leap to unusual achievements (like genetics led to genetic engineering, cybernetics led to the computer age, etc.), thus demonstrating that the new science is much more powerful than the prescientific approaches or the situation without established science.

The first applications of the new science showed significant achievements in the four main areas: science and arts, business and education, as well as some other areas.

- **When applied to the field of science**, the new scientific understanding of creativity led to the *accelerated creation* of 7 new sciences and 3 new fields of research, as well as the *accelerated discovery* of 11 new laws of conservation and 12 new measurement units, not to mention new models, new theories, new concepts, etc.
- **When applied to the field of education**, the new science led to the *most accelerated methodologies* of human mind reorientation from passive, disinterested, negative, lazy, and having low goals into active, interested, positive, ready to work hard, and having high goals.
- **When applied to the field of business** (in this particular case, the business of publishing), the new science led to the Guinness World Record results, i.e., *most accelerated* – (certified) top world accelerated speeds in publishing.
- **When applied to the field of arts**, the new science allowed a group of students in

Psychology of Creativity class to create a new style of arts. So what usually needs 50–100 years *was accelerated* to 10 h of classes.

- **When applied to the field of creativity** itself, the new science led to the design of the *most accelerated methods* of boosting creativity to the megacreativity level and above.

Some details are as follows:

Result #1. The new scientific definition of creativity (see ► [Creativity](#), definition entry, and ► [Creativity Definitions, Approaches](#)) leads to establishing the science of creativity (sozidonics). Thus, what was called the “emerging discipline” or “the field of research” is *accelerated to a higher organization* – transformed into a well-organized science.

Result #2. The research and the experience of structuring the new science of creativity led to general understanding on structuring new sciences. As a result, new sciences, such as agogics (see ► [Creative Leadership](#)), geniusology (see ► [Genius](#)), novology (see ► [Novology](#)), organizology, and intensiology (Aleinikov and Gera 2006), as well as new fields of research, such as creative linguistics (see ► [Creative Linguistics](#)) and creative pedagogy (see ► [Creative Pedagogy](#)), have been designed and introduced for scientific research. This is expanding the modern science horizons. The discovery of these new sciences and research domains not only corroborates the process of *acceleration* in science development (seven new sciences and three new fields of research) but also clearly illustrates a direct giveback from the new science of creativity to the creativity of science.

Result #3. The research of new discovery methodologies, in particular Robert Oros di Bartini’s achievements, led to the discovery of a new law of conservation (Aleinikov 2007a) and then 10 more new laws of conservation by a California-based group of researchers (Aleinikov and Smarsh 2010). For comparison, the previous (natural) development of physical science showed the tempo of one conservation law per 50–100 years.

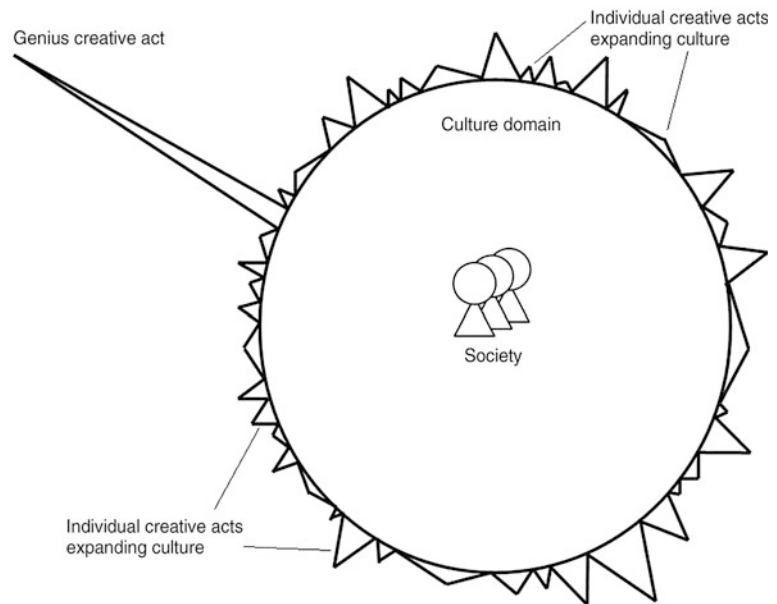
Now, the new understanding of creativity and research of genius methods of thinking from this new point of view allowed researchers to *accelerate the physical science organization* to two new laws per year, i.e., about 200 times acceleration.

Result #4. Search for new creativity-enhancing methods and techniques led to introduction of simple techniques like 4Delays4GeniusWays and semiotic modeling (Aleinikov 2002a) but also to the introduction of methods that *accelerated* creative output many times to achieve kilocreativity (1,000 ideas/min), megacreativity (1,000,000 ideas/min), and more (Aleinikov 1999b, 2002a). See comparison of brainstorming and IdeaFisher above. For more techniques, see ► [Creativity Techniques](#).

Result #5. New measurement units for measuring objective and subjective newness, quantitative and qualitative newness, as well as the efficiency of creative output have been developed to *accelerate* the application of mathematical means to creativity research (see ► [Novology](#) and, for comparison, and ► [Measurement of Creativity](#)).

Result #6. New tools of research, such as a universal model of creative act, which generalizes and explains everything from a speech act to a heuristic act (see ► [Genius](#) as well as *Models of Creativity*), have been introduced. Since it is a graphic model (in terms of graph theory), it allows researchers to visualize creative activities (one picture is worth a thousand words), thus *accelerating* the comprehension of complex concepts and processes. Moreover, having one model for many phenomena follows the principle of economy of force in education, thus *accelerating* the learning process.

Result #7. New definitions (new understandings) led to the development of new educational methodologies and new pedagogy aiming at creation of ideal learner, active, interested, enthusiastic, and ready to work hard, which *accelerates* the study of *any* material, whether it is languages, natural or social sciences (see ► [Creative Pedagogy](#)). Some of these new

Science of Creativity,**Fig. 6** Genius creative act expanding culture

methods like *Method of Applied Nonverbal Dominance* (MANDo) and genius expectations, genius achievements (GEGA) have been published and republished as “Classic” by the *Teaching for Success* online magazine (Aleinikov 2007b, 2009). The new approach to education has been published as an editorial by the *International Journal of Innovative Higher Education* (Aleinikov 1995). These methodologies change children and adults, teachers and professors, schools and colleges. Students and teachers who learn to apply these new methodologies receive their educational institutions’ and even countries’ top awards. Some description of the educational results may be found in Aleinikov (1996) and Aleinikov (1990b) (see ► [Creative Pedagogy](#) and ► [Genius](#)).

Result #8. New educational methodologies, based on the new definitions, turned out to be so effective that they allowed educators to raise the plank from traditional education goals (learning some material and testing well) to nontraditional goals, like changing the mind set and aiming at the highest levels of self-improvement – the top creativity level – genius. Genius Education

Methodology (GEM) has proven to be saving geniuses and revealing hidden genius in the children – even those seemingly lost by traditional education (see ► [Genius](#) and ► [Creative Pedagogy](#)). This *accelerates* the natural process of genius growth. Also, in the future, these “geniuses” will *accelerate* the development of the countries that initiated the process (see Fig. 6). As Fig. 6 demonstrates, the Genius creative act is much more powerful and much more advancing the society than usual individual creative acts. That’s why geniuses cause much more accelerated society development, or, in new term, accelerated expanding of culture domain.

Result #9. New university-level subjects have been introduced to the higher education field: Creative Linguistics (ENG2210), Psychology of Creativity (PSY3390), and Foundations of Creative Pedagogy (EDU6625). This introduction *accelerated* the exposure of adult students to creative learning while learning languages, psychology, and education.

Result #10. The new definition of creativity as accelerating organization led to such outstanding business applications as the Guinness World Record in publishing for the fastest

written, printed, and published book titled “Making the Impossible Possible” (15 h and 46 min “from scratch to publication”) in 2001 in South Africa. It has proven that such a tedious task as book writing (traditionally from a year to 25 years) and book publishing (from 6 months to a year) can be reorganized in such a manner that the process is *accelerated* over 300,000 times.

From the list above, it becomes obvious that the correctly defined **scientific essence** of the phenomenon of creativity, as it usually happens with any science, can make correct predictions, boost practical results, and lead to accelerated development in any field.

Conclusion and Future Directions

Since in the history of humanity creativity was used for solving problems in practically all fields, it varied greatly in its outlook, and that is why it was often not even seen as creativity. After a century of thorough studying, when the creativity phenomenon had been investigated by numerous sciences, the convergent stage of collecting and rethinking the data has been mainly completed. The processes of generalization, restructuring, and designing of the new understanding led to a logical conclusion – the science of creativity.

As a new science, the science of creativity has a new name – sozidonics. It formulates its objectives and the subject of study. It offers a new vision of creativity (new definition), new model of creativity, new classification of creativity, new units and measurements for measuring creativity, thus fulfilling the main criteria for becoming a science.

The new scientific concepts, models, and theories have been tested in the domains other than creativity: in science and arts, business and education where they helped achieve high level results. With the theoretical and practical results so advanced and the proof of success so obvious, sozidonics has proven its right to be considered a science and is now ready for its next divergent move.

First of all, the pattern of creating new sciences (like sozidonics, novology, and geniusology) would be applied for the development and description of already announced new sciences. Organizology and intensiology are waiting for their turn.

Second, at present, in addition to already developed directions, sozidonics is spreading to such diverse areas as:

- New ways of resources conservation
- New ways of treatment in medicine
- New methods of training in sports
- New methods of education in early childhood
- New engines and tools in the financial arena
- New methods of gang fighting and crime prevention

Thus, the new science of creativity in the terms of Sid Parnes, the “father of creative problem solving,” opens “for new challenges.” The prediction is that with most accelerated methodologies, it will achieve outstanding results in these areas too.

Third, and final, sozidonics, as with any science, is never completed. It should and it will continue to develop itself: the horizons and the opportunities are unlimited.

Cross-References

- ▶ [Adaptive Creativity and Innovative Creativity](#)
- ▶ [Convergent Versus Divergent Thinking](#)
- ▶ [Creative Behavior](#)
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- ▶ [Multiple Models of Creativity](#)
- ▶ [Nature of Creativity](#)
- ▶ [Novology](#)
- ▶ [Psychology of Creativity](#)
- ▶ [Research on Creativity](#)

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Scientific Creativity as Combinatorial Process

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Synonyms

[Blind-variation and selective-retention theories of scientific discovery](#)

Introduction

The progress of science depends on creative ideas. An idea is creative if it is novel, useful, and surprising. A novel idea has never appeared before; a useful idea entails a theory, technique, or empirical result that advances a particular scientific discipline; and a surprising idea is one that is not an obvious derivation from an already existing idea. These three criteria closely parallel those that the US Patent Office uses in evaluating whether inventions warrant patent protection. Given these definitions, the fundamental question then becomes: Where do scientists get their creative ideas? One answer is to make appeals to “strokes of genius,” “flashes or insight,” “brilliant intuitions,” or some other romanticized concept. Such responses do not provide a scientific basis for understanding creativity in the sciences. They seem to suggest that creative ideas can emerge

de novo. Yet for science to constitute a cumulative enterprise, even the most creative scientists must build upon the theories, techniques, and results of their predecessors. Even Isaac Newton admitted that he stood on the “shoulders of giants.”

The mathematician Henri Poincaré (1921) provided a superior answer: Creativity is combinatorial. Old ideas are recombined to generate new ideas. He even suggested that this combinatorial procedure is effectively random. Nonetheless, it is not necessary that the combinations be random so long as they are blind, that is, the ideas are generated without knowing in advance, which combinations will prove fruitful and which will fail. This latter provision is assumed in blind-variation and selective-retention theories of scientific discovery (Campbell 1960). Although all random combinations are blind, not all combinations are random. To illustrate, a systematic search is blind without being random.

Combinatorial models have made important contributions to comprehending scientific creativity (e.g., Fowler 1987; Thagard 2012). To provide an overview, the three systems involved in creativity are defined first. Then implications are drawn for each of the systems.

Three Systems

Scientific creativity requires the interaction of three systems: the domain, the field, and the individual (Simonton 2010). The domain and the field together constitute a scientific discipline. The domain consists of a set of ideas that define a particular discipline. The field consists of the fellow scientists who are actively contributing to that domain. These colleagues are ultimately responsible for deciding whether any scientist has contributed to the discipline. This decision is made in peer review and citation practices. Fields can also vary in size: New fields tend to be small, old fields large. Finally, the individual is one of the members of the field. In most combinatorial models, he or she is the actual locus of creativity (e.g., Simonton 1988; Thagard and Stewart 2011; but see Fowler 1987).

Combinatorial creativity cannot begin until each individual scientist first obtains a sample of ideas from the domain. Presumably, these

ideational samples are acquired during education and training, albeit a significant portion can be acquired through independent reading and study. Furthermore, the samples are not identical for each scientist, even for scientists active in the same field. For one thing, scientists can vary in the sheer size of their ideational samples. Whereas some scientists may be extremely focused on a very narrow specialty area, other scientists will exhibit much broader interests that encompass most or all of the ideas representing a given domain. Another important difference is whether the samples of ideas are confined to a particular domain or instead cut across two or more domains. An instance of the latter is the scientist who changes fields, bringing the knowledge of one domain to bear on the new knowledge acquired in another domain. A final contrast is related to the previous two: to what extent the scientist's sample of ideas overlaps the samples of other scientists working in the same domain.

Each individual's ideational sample is then subjected to combinatorial procedures. These procedures may be either implicit (intuitive and haphazard) or explicit (conscious and systematic). Of all the combinations generated, only a small number will prove sufficiently creative. These ideas will then undergo development and elaboration into a completed paper that can be submitted for publication. If the paper passes peer review, its creative ideas become part of the domain and thus can enter the ideational samples of other scientists. The upshot is a cyclical process that allows for the accumulation of knowledge.

Individual System

Combinatorial models at the individual level attempt to describe the key features of scientific productivity (Simonton 1988). One of these features is how scientists vary in total lifetime output. This variation is characterized by an extremely skewed distribution with a long upper tail. As a result, a smaller percentage of the scientists in any field account for a disproportionate amount of the creative products. Specifically, the top 10 % may account for as much as half of all

output. This skewed distribution is surprising insofar as most individual-difference variables underlying creativity – such as intelligence, openness to experience, and divergent thinking – would be expected to be normally distributed. Nevertheless, if it is supposed that the domain samples of each type of scientist are of unequal size, and if it is assumed that the size of these samples is normally distributed across members of the field, then it follows that the total number of ideational combinations that can be generated must be described by a highly skewed lognormal distribution. That results because the number of combinations increases exponentially with the number of ideas being combined.

More complex are the combinatorial models that attempt to try to explain how total output is distributed across the course of a scientist's career (Simonton 2004). The simplest models predict that creative ideas will be randomly distributed across the career. That prediction arises under the assumption that the combinatorial process operates according to BVSR, that is, blind variation and selective retention. That is, because the scientist cannot anticipate the novelty and utility of a combination until after it is generated and tested, creative combinations will come and go throughout the career. In contrast, if the combinatorial process were highly sighted, then the best ideas would be produced first, and the less creative ideas would appear later in the career. In short, in the absence of BVSR, scientists should show a progressive decline in creativity with age.

The previous model is highly simplified. It just assumes that scientists are merely pulling balls randomly out of an urn and then saving the combinations that satisfy some criterion. For example, the balls might be marked with integers, and the individual must identify those combinations that represent prime numbers (as in the sieve of Eratosthenes). More sophisticated models allow for the fact that the creative process is more complex than that (Simonton 2010). For instance, one model posits that creativity consists of the two-step process of ideation and elaboration. Combinations of ideas are generated in the ideation stage, but these combinations must then be

elaborated into final creative products. Because of the temporal delay imposed on the combinatorial procedure, creative ideas will be distributed unevenly over the course of the career. In particular, annual output will rise rapidly to a peak productive age after which a gradual decline sets in, approaching a zero productivity rate asymptotically. With the addition of further complications, such models can account for the finer features of output. For instance, if the ideation and elaboration rates are allowed to vary across domains (to reflect the nature of the ideas in those domains), then different output trajectories will be predicted for various domains. Thus, because the ideation and elaboration rates are much faster in mathematics than in the earth sciences, mathematicians will have earlier career peaks than holds for earth scientists.

These and other predictions have been successfully tested against empirical data, lending support to the conjecture that individual creativity depends on combinatorial procedures (Simonton 2004). Moreover, computer simulations have provided insights into how the combinatorial process might operate (Thagard and Stewart 2011). Lastly, it should be noted that the hypothesized combinatorial process is compatible with those psychological theories of the creative process that assume the involvement of remote association, divergent thinking, and defocused attention (Simonton 2010). These provide the means for freely linking the ideas making up a scientist's domain sample.

Domain System

It was said that the three-system cycle permits the accumulation of scientific knowledge. This growth raises the issue of how fast that knowledge accumulates. As a first approximation, because the total number of scientists has been increasing exponentially, one might suppose that scientific knowledge has also been increasing exponentially. Yet this inference neglects the repercussions of having the domain size increase as well. If the addition of new ideas is a joint function of field size and domain size, then the growth will be accelerated even more (Fowler 1987), providing the basis for the “information

explosion.” One consequence of this explosion is that disciplines will much more quickly fragment into largely independent subdisciplines. The domains and fields become too vast to continue as coherent endeavors. Of course, this accelerated trend also puts more pressure on scientists to become much more specialized, reducing the prospects for grand integrative theories.

Field System

Among the most dramatic episodes in the history of science and technology is the frequent appearance of multiple discoveries and inventions (Simonton 1988). These occur when two or more scientists independently arrive at the same idea. Two famous examples include the theory of evolution by natural selection contributed by Charles Darwin and Alfred Wallace and the invention of calculus by Isaac Newton and Gottfried Leibniz. Many sociologists and anthropologists adopted multiples as proof of sociocultural determinism. That is, at a particular moment in the development of a discipline, certain discoveries or inventions become inevitable.

Even so, the phenomenon of multiples can be easily explicated in terms of combinatorial models (Simonton 2010). If a field consists of individuals who are recombining ideas obtained from the same domain, then it necessarily follows that two or more scientists may generate identical or nearly identical combinations. At the same time, combinatorial models provide a useful means for predicting the details of this phenomenon. As an example, consider how multiples vary regarding their grades. The grade of a multiple is the number of scientists who independently arrive at the same idea. Combinatorial models predict that frequency of a given multiple grade will be a negative monotonic function of the grade – as described by a Poisson distribution. In other words, high-grade multiples will be very rare, the majority of multiples will be doublets, and the most common outcome will be a singleton, that is, a discovery made by a single scientist. This prediction has been borne out in investigations using different data sets.

Besides predicting the distribution of multiple grades, combinatorial models can also predict

(a) the temporal separation of multiples (i.e., how much time lapses between first and last discovery), (b) multiple congruence (i.e., how many ideas are actually shared, given that most multiples are not perfectly identical), and (c) individual differences in how many multiples each scientist contributes. So far, these predictions have also received empirical support (Simonton 2004). Because combinatorial models are probabilistic rather than deterministic, their predictive success undermines the inference that discoveries and inventions must be inevitable.

Conclusion and Future Directions

Although this entry has focused on applying combinatorial models to scientific creativity, it should be apparent that other forms of creativity can also be so viewed, including artistic creativity (Simonton 2010). In fact, in some respects, creativity in the arts may rely more on combinatorial processes than holds in the sciences. The reason for the greater dependence is that artists generally operate under fewer logical and factual constraints than scientists do. The most obvious example is so-called artistic license. If novelists, poets, painters, or filmmakers wish to have a character defy the energy conservation law, nothing prevents them from doing so. That option is not available to a physicist, chemist, or biologist. Furthermore, because artistic domains are more loosely defined, artists have more freedom to use idiosyncratic samples of ideas in their combinatorial creativity. Many novels and poems are partially autobiographical, the ideas coming from life experiences that make each novelist or poet unique. These differences between artistic and scientific creativity help explain why multiples are extremely rare in the arts.

The explanatory value of combinatorial models can certainly undergo elaboration and extension in future research. Although combinatorial procedures have already been translated into both mathematical and computer models, these translations remain preliminary. A complete account of scientific creativity will require more advanced versions of current models. Perhaps the

most conspicuous problem is that much contemporary scientific creativity occurs in research teams, a fact documented by the large number of coauthors on most journal articles. Consequently, it would seem advisable to include collaborative groups in the systems perspective. The resulting mathematical and computer models would then have to be modified.

Cross-References

- ▶ [Age and Creative Productivity](#)
- ▶ [Creativity and Age](#)
- ▶ [In Search of Cognitive Foundations of Creativity](#)

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Scientific Creativity, Discourses

- ▶ [Creativity, Discourses](#)

Scientific Elite

► [Networks and Scientific Innovation](#)

Scientific Invention

► [Creativity in Puzzles, Inventions, and Designs: Sudden Mental Insight Phenomenon](#)

Scientific Inventive Thinking Skills in Children

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Synonyms

[Creative scientific enquiry](#); [Guided creative idea](#); [Supervised imaginative activity](#)

The terms “scientific,” “inventive,” and “thinking” seem, at first glance, to be incongruent with the word “children.” Nevertheless, historical evidence of diaries, notes, interviews, and oral histories of earlier and contemporary inventors emphasized the role of childhood play experiences as the critical development of “inventive thinking” skills. According to Judd et al. (2002) through play, children develop essential inventive thinking skills such as exploring using all senses, imagining and pretending, social play and communicating, and playing with puzzles and patterns. During the earlier times, these activities were done in a leisurely way, with children freely exploring the inventiveness side of themselves while having fun playing, alone or with friends. Inventive thinking in children is rooted in curiosity, creativity, and the ability to understand and manipulate the properties of material world in order to adapt and adjust to the surrounding

environment. This shows that, somehow, inventive thinking is part of children’s natural ability.

However, nowadays, with everything digital, children’s playground has become more “virtual” instead of “physical” and “real.” Although the “fun” element is still there and in fact boosted with what is called “virtual reality,” there is growing concern that students are not being encouraged to think and are losing some basic skills for defining, understanding, and solving problems (Raviv 2000). Computer games and the Internet have dominated children’s life, and so the element of inventive thinking skills is deliberately dissipated as most of the thinking is being done for them by the computer. In spite of this, the notion of “inventive thinking” skills has become more of a necessity where the skills are seen as valuable intellectual capital that is increasingly important to the children entering the work force in the twenty-first century. There are demands for the children to be inventive; namely, they must be able to adapt and manage the complexity of globalization and the World Wide Web and have self-direction fuelled by curiosity, creativity, and risk taking while at the same time capable of making higher-order thinking and sound reasoning. Now, there are efforts to integrate “scientific inventive thinking” in schools science teaching and learning with the aim of nurturing children’s scientific inquisitiveness and attitudes toward the subject. The scientific inventive thinking skills stressed in this entry are a combination of twenty-first-century skills, inventive thinking skills, and scientific thinking skills. The relationship between these skills is to be discussed and the underpinned educational theoretical background will be further explained.

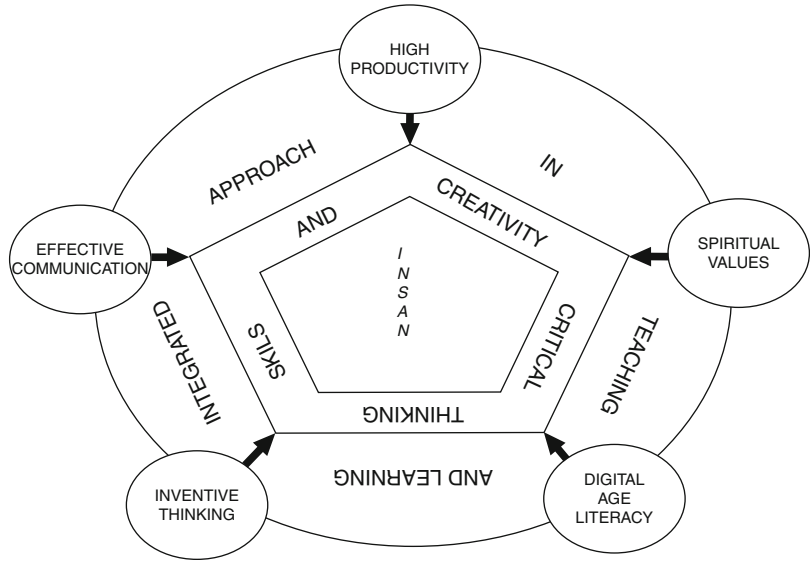
Scientific Inventive Thinking Skills in Children

Twenty-First-Century Skills

In order to meet the demands and expectations of twenty-first-century workforces, twenty-first-century skills become key skills that must be acquired by all students. Knowledge-based

Scientific Inventive Thinking Skills in Children,

Fig. 1 Domain of twenty-first-century skills (Source: Kamisah et al. 2010)



economy requires tremendous manpower competent in twenty-first-century skills. The enGauge twenty-first-century skills framework listed four main skills that are important for twenty-first-century students: digital age literacy, inventive thinking, effective communication, and high productivity. The present author included spiritual values to the existing enGauge framework; the rationale of this action is aimed at producing a holistic human capital (INSAN) in the intellectual, spiritual, emotional, and physical aspects (Kamisah et al. 2010) (see Fig. 1).

As the world becomes boundless, due to globalization and the World Wide Web, with the richness of this knowledge around them, children today can construct a science project, build their own tree house, invent a new toy for themselves, or even make a bomb and assemble a homemade gun. These activities perhaps show the inventiveness of children but the last two touch on the ethical ground of how children should act with all the knowledge that is easily within their reach. There is increasing concern about the recent phenomenon of children being involved in criminal acts and irresponsible behavior, and so spiritual values besides other twenty-first-century skills should be inculcated in children’s educational programs including the implementation of

scientific inventive thinking skills. Figure 1 illustrates the modified twenty-first-century skills which include the inventive thinking and the spiritual value domains (Kamisah et al. 2010).

Inventive Thinking Skills

Invention is the breaking down of conventional similarities and the making of new and unusual connections. Most of society relates invention to something irrational. Thus, invention is not easily accepted by everybody. Definitions of inventive thinking have never been monotonous. Much of the literature about inventive thinking skills especially in children has discussed various aspects of the skills such as curiosity, creativity, exploring using all senses, imagining and pretending, ability to manage complexity, risk taking, making higher-order thinking, sound reasoning, and problem solving. These components are essential tools in developing children’s inventive thinking where it required students to be critical and creative.

Using the enGauge twenty-first-century skills framework, the inventive thinking skills implied here comprise the following skills: adaptability and managing complexity, self-direction, curiosity, creativity, risk taking, higher-order thinking, and sound reasoning. These skills

grasp the aspect of inventive thinking that is important for students as highlighted above. The six skills are described as follows:

1. *Adaptability and managing complexity* refers to the ability to handle changes, sophisticated problem, or obstacles calmly, confidently, and positively while planning successfully for resource management.
2. *Self-direction* refers to the ability to be an independent learner, able to set his/her own goals, to do planning to achieve goals, and to evaluate his/her own work from the learning experience.
3. *Curiosity* refers to the intrinsically motivated desire to know and make an active attempt to learn about it.
4. *Creativity* refers to the ability to produce original, unique, novel, and genuinely new ideas, products, or alternative solutions either individually or culturally.
5. *Risk taking* refers to daring to tackle challenging tasks or unconventional problems without obvious solutions with high integrity.
6. *Higher-order thinking and sound reasoning* include the cognitive domains of analysis, comparison, inference, interpretation, evaluation, and synthesis applied in academic fields and problem-solving contexts.

Scientific Thinking Skills

Science emphasizes inquiry and the problem-solving process. Scientific thinking skills are utilized because they are a mode of thinking suitable for all scientific subjects, contents, and problems. Scientific thinking skills require systematically and structured steps to carry out the experiment or scientific investigation. Intellectual standards in scientific thinking include clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness. They also, as in inventive thinking, require students to be critical and creative.

In order to acquire scientific thinking skills, science process skills must be mastered. Science curricula include science process skills such as observing, classifying, measuring and using numbers, inferring, predicting, communicating, using space-time relationship, interpreting

data, defining operationally, controlling variables, hypothesizing, and experimenting. At the same time, manipulative skills are also an important component of scientific thinking. Manipulative skills in scientific investigation are psychomotor skills that enable students to:

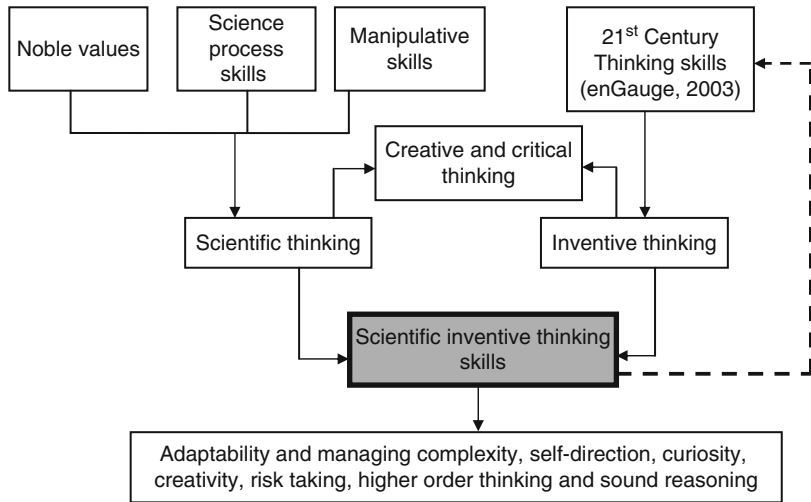
- Use and handle science apparatus and laboratory substances correctly
- Handle specimens correctly and carefully
- Draw specimens, apparatus, and laboratory substances accurately
- Clean science apparatus correctly
- Store science apparatus and laboratory substances correctly and safely

Meanwhile, scientific attitudes and noble values must be inculcated during science teaching and learning process. The rationale of inculcating scientific attitudes and noble values in scientific inventive thinking is to ensure that children have the mind-set to invent something beneficial to mankind and not to bring a destructive element into the world. These attitudes and values encompass the following:

- Having an interest and curiosity toward the environment
- Being honest and accurate in recording and validating data
- Being diligent and persevering
- Being responsible about the safety of oneself, others, and the environment
- Realizing that science is a means to understand nature
- Appreciating and practicing clean and healthy living
- Appreciating the balance of nature
- Being respectful and well mannered
- Appreciating the contribution of science and technology
- Being thankful to the Creator
- Having critical and analytical thinking
- Being flexible and open minded
- Being kind hearted and caring
- Being objective
- Being systematic
- Being cooperative
- Being fair and just
- Daring to try
- Thinking rationally

Scientific Inventive Thinking Skills in Children,

Fig. 2 Scientific inventive thinking skills



- Being confident and independent
- Understanding and practicing the skills of critical thinking

Considering the interrelation between scientific thinking, inventive thinking, and twenty-first-century skills, scientific inventive thinking is referred to as guided creative idea or supervised imaginative activity that could enhance children’s innate ability. A scientific inventive thinker must be a person who is systematic, guided by some rules, and has these features: adaptability and managing complexity, self-direction, curiosity, creativity, risk taking, higher-order thinking, and sound reasoning. Figure 2 below shows the relationship between twenty-first-century thinking skills, inventive thinking, science process skills, manipulative skills, noble values, creative and critical thinking, and scientific inventive thinking.

Educational Theoretical Background

With the idea of instigating the scientific inventive thinking skills in schools, researchers and educators have produced teaching and learning approaches and methods that can, by implication, enhance students’ scientific inventive thinking skills. These teaching and learning approaches and methods depict educational theories that support inventive thinking skills. Here are some of

the educational theories which support scientific inventive thinking skills in children.

Jean Piaget’s Cognitive Development Theory

The theory of cognitive development by Jean Piaget (1896–1980) figured out that children at the stage of preoperational (2–7 years old) are very highly imaginative. They also are egocentric and find it difficult to accept the viewpoint of others. They see the world differently from adults. Inventive thinking requires an imaginative mind. That is why children are more creative than adults.

The ability to think inventively is a natural feature among most children; they do not need to attempt to do so. It involves mainly both creativity and problem-solving skills. Normally, creativity leads to problem solving, an important skill which should be inculcated in children’s early years. To be inventive means to be able to find out connections and similarities in unusual ways. Children are naturally inventive and unaware of adults’ responses and perspectives toward the world. They tend to connect something not usually connected and disconnect what adults think to be similar. However, this natural ability diminishes as the child grows up. His expectation and perception start to dictate his thinking. He begins to expect before things happen and to see without really looking. His life becomes routine, bored, and stereotyped.

Normally, school curriculum tends primarily to evaluate memory skills, and there is less emphasis on the thinking skills which are more important after formal education ends. Undoubtedly, basic factual knowledge is a necessity, but cannot make a child become an inventive thinker. Inventing lets the children work like a scientist. The creative and critical thinking develops automatically in the process of inventing. An inquiring approach is highly related to the invention process. Children explore and construct their own knowledge. They are motivated and gain the skills which can be used throughout their lives. Preparing plenty of engaging materials is the first step in inspiring an inventive spirit in children. Allow them enough time to investigate and to do experiments with the material. In fact, ordinary material is enough to encourage children to think inventively. The teacher should be able to ask good and right questions to facilitate children to think in many different dimensions. Appropriate comments from the teacher also can stimulate inventive thinking in children. It is very important for the teacher to be a role model who always practices inventing skills as a part of life.

Revised Bloom's Taxonomy (2001)

The Revised Version of Bloom's Taxonomy was proposed in 2001 based on the findings that most of the skills can be gained simultaneously; the old version of the taxonomy suggests that the tougher knowledge only can be acquired once we have mastered the basic. The new version of the taxonomy also emphasizes the idea that knowledge and thinking must be joined in the learning processes. [Table 1](#) shows the revised Bloom's Taxonomy.

Integration of content knowledge with the advanced cognitive domain into teaching and learning makes it easier for the children to acquire the content knowledge. Through the continuum of the cognitive domain skills, teachers need to push students up to the top of the taxonomy – creating. Creating is the most advanced cognitive domain which requires students to produce something entirely novel or original. It could be a new idea, a unique product, or an alternative solution to a problem. Explicit skills

can be retrieved from the creative domain which includes inventing. Inventing is categorized as a higher-order thinking skill and requires sophisticated and complex thinking. During the inventing process, it could be argued that the rest of the higher-order thinking is applied at the same time. However, there is no rigid sequence in the continuum. No rule could state that the cognitive domains should follow a certain order.

Creative Problem Solving

Creative Problem Solving (CPS) is a well-known model in nurturing inventive thinking skills, by linking the learner's natural creativity and problem-solving approaches. The latest version of CPS is Version 6.1 as shown in [Fig. 3](#). CPS Version 6.1TM guides the learner to use both his/her creative and critical thinking skills in harmony, either individually or in group. The four main cognitive processes involved are as follows: understanding challenges and opportunities, generating ideas, developing effective plans for solving problems, and managing change. Convergent and divergent thinking are both employed through the whole system in the CPS (Treffinger et al. 2000). By employing this creative model of solving problem, individuals or groups will be able to act on chances, respond to challenges, balance creative and critical thinking, build collaboration, overcome concern, and, more importantly, managing change.

TRIZ (Theory of Inventive Problem Solving)

Another educational theory that supported scientific inventive thinking skills is TRIZ. TRIZ is the acronym in Russian, which means "theory of inventive problem solving." TRIZ has been used worldwide across many fields. At first, TRIZ was established in an engineering field. However, utilization of TRIZ has now expanded to the nontechnical field of education. TRIZ is a method of inventive problem solving based on logical data and is not intuitive. [Figure 4](#) shows the TRIZ problem-solving method.

Marsh et al. (2002) redefines the contradiction matrix for business and management into educational contradiction matrix and 40 educational

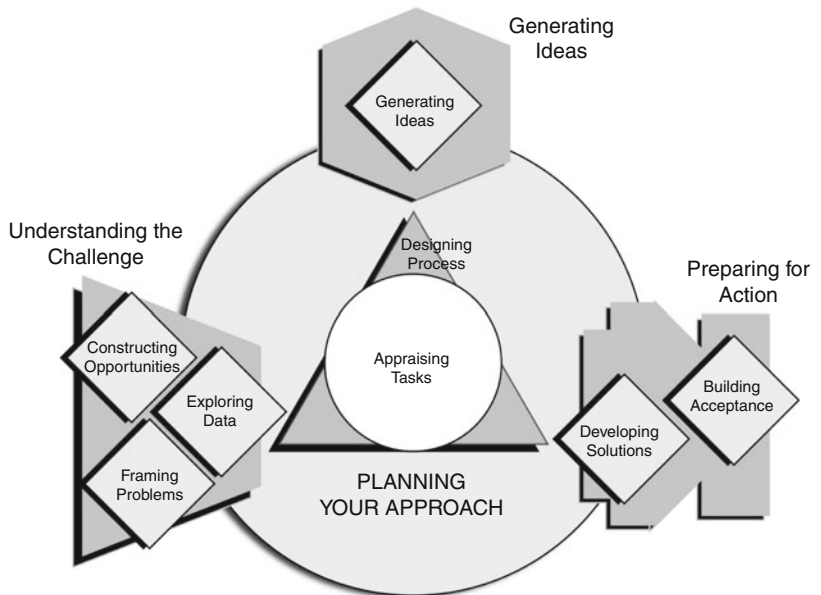
Scientific Inventive Thinking Skills in Children,

Table 1 Revised bloom’s taxonomy (2001) (Source: David 2002)

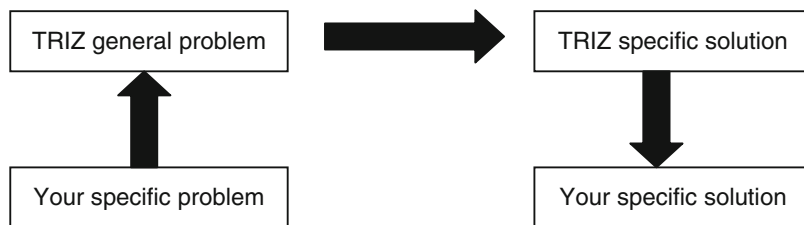
Cognitive domains	Descriptions	
↑ Create	Generating new ideas, products, alternative solutions, and new way to view things. Examples of skills: designing, constructing, planning, producing, inventing, developing, formulating etc.	Higher order thinking
Evaluate	Justifying a decision or course of action. Examples of skills: Checking, hypothesising, critiquing, experimenting, judging, selecting, valuing, defending, appraising etc.	
Analyse	Breaking information into parts to explore understandings and relationships in depth. Examples of skills: Comparing, organizing, deconstructing, interrogating, finding, distinguishing, examining, criticising etc.	
Apply	Using information in another context or new situation. Examples of skills: Implementing, carrying out, using, executing, employing, solving, sketching, illustrating, operating etc.	Lower order thinking
Understand	Explaining ideas or concepts. Examples of skills: Interpreting, summarising, paraphrasing, classifying, explaining, describing, identifying, reporting etc.	
Remember	Recalling information. Examples of skills: Recognizing, listing, describing, retrieving, naming, finding, memorizing, stating, reproducing	

Scientific Inventive Thinking Skills in Children,

Fig. 3 Creative problem solving version 6.1 © 2011, Center for Creative Learning, Inc. and Creative Problem Solving Group, Inc. (Reproduced by permission)



Scientific Inventive Thinking Skills in Children, Fig. 4 TRIZ problem-solving method (Source: Marsh et al. 2002)



inventive principles, which address both administration and classroom examples. The 40 inventive principles are:

1. Segmentation
2. Taking out
3. Local quality
4. Asymmetry
5. Merging (combining)
6. Universality
7. “Nested doll” (Matryoshka)
8. Anti-weight (counterweight)
9. Preliminary anti-action (prior counteraction)
10. Preliminary action
11. Beforehand cushioning (cushion in advance)
12. Equipotentiality
13. The other way around (inversion)
14. Spheroidality – curvature
15. Dynamics
16. Partial or excessive actions
17. Another dimension
18. Mechanical vibration
19. Periodic action
20. Continuity of useful action
21. Skipping (rushing through)
22. “Blessing in disguise” (turn lemons into lemonade)
23. Feedback
24. “Intermediary”
25. Self-service
26. Copying
27. Cheap short-living object
28. Mechanics substitution
29. Pneumatics and hydraulics (intangibility)
30. Flexible shells and thin films
31. Porous materials
32. Color changes
33. Homogeneity
34. Discarding and recovering (rejecting and regenerating parts)

35. Parameter changes (transformation of properties)

36. Phase transitions
37. Expansion of events or processes
38. Boosted interactions
39. Inert atmosphere
40. Composite materials

Conclusion and Future Directions

The idea of nurturing scientific inventive thinking skills in children needs a detailed debate between educational stakeholders, researchers, practice communities (e.g., scientist and inventor), and policy makers. This debate should take into account of how, what, who, when, and where; it should address some or all of the points at issue and should also consider a practical route map for developing strategy and policy around integrating scientific inventive thinking skills in school and learning.

Although there are many arguments made about the importance of scientific inventive thinking skills in children, there remains significant ambiguity about how the skills should be integrated in the teaching and learning process. Educational theories in this topic (e.g., Piaget’s cognitive development theory and Bloom’s Taxonomy) have stated the ground information for educators especially teachers on cognitive domain where inventive thinking took place and how it can be manipulated via activities such as creating and designing. However, there is a lack of research evidence on how to integrate scientific inventive thinking skills successfully in teaching and learning process in schools. Moreover, the education concepts like twenty-first-century inventive thinking skills, CPS, and

TRIZ are new concepts that need further exploration especially in terms of implying and applying the concepts in the actual classroom teaching and learning activities.

Apart from the need for more research in this topic, support for teachers is also essential in order to make sure that the effort to implement scientific inventive thinking skills in students' learning is successful. As in any other new concept, teachers may be unfamiliar with scientific inventive thinking skills and lack training or support on how to implement and meaningfully integrate it in the classroom. The provision of teacher professional development support materials, supplemented with the research evidence report, will enable teachers to explore practical use of the skills in science teaching and learning process. It is suggested that a pilot program for both student teachers and professional teachers is implemented to identify the practical strategies for a scalable and sustainable training initiative of scientific inventive thinking skills. Another important measure is to ensure "classroom thoughtfulness," in which students' learning environment is conducive toward the development of inventive thinking skills.

Also recommended is the establishing of a national center for scientific inventive thinking skills dedicated to exploring aspects of the implementation of scientific inventive thinking in educational contexts. Perhaps the center could be a think tank for the younger generation and provide them with opportunity to access the relevant technologies of various activities and encourage them to become creative and inventive. It would also provide a knowledge-sharing facility for teachers and educators to access accounts and case studies of others' experiences, of advice, support, and training. In order to attract practice communities of scientific inventive thinking into educational contexts, there should be some incentive to encourage their powerful and influential role in children's lives. Opportunity should be given for them to share their experiences of specialist topics so that their view could have an impact on the formal education system in terms of applying scientific inventive thinking skills. Finally, students' ability to employ scientific

inventive thinking should also be part of the assessment process. This is because as commented by Torrance (1993; p. 158) "no educational innovation can succeed and endure unless it is supported by appropriate retooling in the forms of methods, instructional materials, assessment procedures, and statement of objectives."

Cross-References

- ▶ [Convergent Versus Divergent Thinking](#)
- ▶ [Creativity and Innovation: What Is the Difference?](#)
- ▶ [Creativity Techniques: Use of Creativity Techniques in Innovation Processes](#)
- ▶ [Invention Versus Discovery](#)
- ▶ [Promoting Student Creativity and Inventiveness in Science and Engineering](#)
- ▶ [Science of Creativity](#)
- ▶ [Thinking Skills, Development](#)

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Scientist Entrepreneurship

- ▶ [Academic Entrepreneurship](#)

Sectoral Innovation Systems

- ▶ [National Innovation Systems \(NIS\)](#)

Seed Funding

- ▶ [Entrepreneurship and Financial Markets](#)

Seed Money

- ▶ [Entrepreneurship and Financial Markets](#)

Self Entrepreneurship

- ▶ [Microfirms](#)

Self-Brainstorming

- ▶ [Idea-Marathon System \(IMS\)](#)

Self-made Man

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Synonyms

[Autodidact](#); [Entrepreneur](#); [Pioneer](#)

Being a Self-made Man

Whether described as a “great man” or a “man of genius,” the self-made man represents the archetype of successful men - and more and more women - who start from low stations in life, with poor educational backgrounds, and climb the social ladder to become key figures in society.

Origins of the Myth: The Roots of the “American Dream”

Frederick Douglass, an escaped slave and a leader of the Abolitionist movement, provided the first definition of the “self-made man” in a lecture in 1859 (Douglass 1955). This new man, based on the Roman idea of “*novus homo*,” played a prevalent role in public life. Preceding Douglass, Benjamin Franklin, one of America’s Founding Fathers, was one of the best-known examples of a self-made man. His autobiography described his rise from working-class origins to his life as a powerful inventor, businessman, and politician (Franklin 1793). Abraham Lincoln also captured the public imagination, making the improbable leap from lowly log cabin to the White House.

During the so-called Second Industrial Revolution, the concept became popular and began to encompass economic success. New inventions quickly made men rich and famous, and factories sprung up throughout the country. Inspired by real-life examples like Andrew Carnegie, the self-made man became a common archetype in literature and popular culture, especially in the

“rags to riches” stories of authors like Horatio Alger Jr. (Wyllie 1954). These stories gave the poor hope that they too could rise to a better situation. In some societies, this sense of social mobility is an important part of the national identity. This concept is strongly tied to the notion of the American Dream, which took hold in the early to mid-twentieth century.

Predisposing Factors of the Self-made Man: Learning from Well-Known Cases

The purpose here is not to provide an all-inclusive list of self-made men. In reading the biographies of several famous self-made men, however, one can observe recurring phenomena in their pasts and draw conclusions regarding certain common characteristics among them.

Deficits During Childhood

Many people described as self-made men have experienced difficulties, both physical and emotional, in their childhood. Some experience the absence of one of both parents, as was the case for Larry Ellison (Oracle), or abandonment, as for Leonardo Del Vecchio (Luxottica), who lived in an orphanage, and Steve Jobs (Apple), who was given up for adoption. Others felt the lack of a stable and loving family structure. For example, US Senator Harry Reid grew up with an alcoholic father who worked as miner and possessed only an elementary school education. Amancio Ortega Gaona (Zara) was a railroader’s son who left school at age 14. These self-made men share beginnings in economic disadvantage and sometimes discouraging surroundings. Some were born to parents who were uneducated (Thomas Edison), immigrants (Andrew Carnegie), or working class. For some, the difficulties were tangible, with primary needs such as food and safety going unmet. These difficulties and disadvantages left them to forge their own successful paths, as Oprah Winfrey did.

Adolescence: A Time of Struggle

Many of our exemplars of the self-made man had difficult relationships with parents and teachers.

Some left the educational system during secondary school, often easily distracted and underestimated by their teachers. John Paul DeJoria (John Paul Mitchell Systems) was told by a math teacher that he would “never succeed at anything in life”; he accepted that criticism as a challenge to succeed at whatever he undertook.

Some had to leave school to work due to economic necessity. They found part- or full-time work to help provide for their families. Andrew Carnegie’s first job was working as a bobbin boy at a textile factory, making \$1.50 a week. Some went to high school and also held a job; Ray Kroc (McDonald’s) worked nights as a security and Sam Walton (Walmart) was a lifeguard, newspaper delivery boy, and waiter. A common theme is that many attained their first job by employing a bit of dishonesty, such as an exaggeration about previous work experience. For various reasons, many self-made men have not completed college (Steve Jobs graduated high school in 1972. He left college after six months even if he continued to audit classes; Dell dropped out of Univ. of Texas, but was making thousands of dollars already as a high school student; Ralph Lauren dropped out of Baruch College after two years; and François Pinault).

Sociologists and public policy experts stress the effects of poverty and culture in determining an individual’s success. During times of difficulty or struggle self-made men learn how to survive in a world where poor people taken for granted; they learn the qualities of perseverance and self-discipline (e.g., Ross Perot, Electronic Data Systems).

Unlike children who come families where an enterprising ethic has been present for generations, self-made men are focused on survival. Relying neither on good luck nor waiting for a godsend, they have learned early to invest and fructify a small – and often borrowed – amount of capital (Sam Walton) and then religiously saved their money and reinvested it in the business (Larry Ellison, Oracle).

Adulthood: On the Road to Prosperity

Except in the cases of computer hardware and software (Apple, Dell, Oracle), self-made men

rarely get the “idea of the century”; rather, they focus on some unexplored economic niches of development. They all put passion, time, and sweat in their work, having previously had to fight against others and society as a whole. As new businessmen, they have courage and an indomitable will to be useful and independent citizens. They want to be judged by the kind of success they achieve. As was the case with John D. Rockefeller, none of these self-made men want to leave their business or any part of it to anyone else. They use both vertical and horizontal integration.

Wisdom of Age

At the end of their lives, self-made men who have managed to pull themselves up through hard work and determination don't especially seek to distinguish themselves from the common man. Though a person of this class does not need to claim to be a hero or to be worshipped as such, there is a genuine heroism in their struggle and something of sublimity and glory in their triumph. Every instance of such success is an example and benefit to humanity. Self-made men hope to inspire others to join their ranks. Rockefeller donated much of his fortune in hopes of providing others with similar opportunities for success. Andrew Carnegie wrote “The Gospel of Wealth,” a philosophy in which a man should aim to acquire as much fortune as possible and finally give it away to philanthropic causes.

Controversies Around this Sociotype

Some controversies exist concerning the making of the self-made man and also about his dynamic position in the society.

Social Darwinism Versus the Labor Movement

American sociologists were the first to deeply explore and analyze the concept behind the notion of social upward mobility. Indeed, various conservative and liberal schools of thought

enhance the figure of “self-made man,” but not for the same reasons. In fact, the former believes that any individual can flourish without any outside help and thus without subsidies from the government. This conception deeply nourishes the myth that every citizen, regardless of race, wealth, creed, color, or gender, can not only expect, but also receive, justice and fair play from society, on only one condition: doing one's best.

At the same time, the latter group of academics and public policy experts believe that the “rise of plebeians” will only happen in a state able to make a right place for every meritocratic man and ask for ambitious policies to product efficient social lifts. This concept of meritocracy, in developed as well as in the emerging countries, enhances the capability of a nation to give birth to new elites, refreshing an existing social order, represents a central issue.

Whatever the point of view is conservative or liberal, a romanticism and sentimental glamour envelops the self-made man, magnifying his proportions. Their examples are often used to justify social Darwinism and to oppose labor movements. It can be argues that the illusion of the “self-made man” helps to keep the working class in line and prevents them from agitating for an overall collective change in the direction of social equality.

The term *meritocracy* is defined as a society that rewards those who show talent and competences as demonstrated by past actions or competitive performances. It refers to a utopian future in which one's social place is determined by IQ and effort. The counter-argument to the self-made man concept is that there is *not* a correlation between hard work and economic success. In fact, the people who work the longest hours and expend the most energy are usually the poorest; and really big money doesn't come from working, it comes from owning assets.

Self-made Man as a Networked Person

Self-made men attain their success through hard work, diligence, sometimes education, and faith

in the system; however, one knows that “no man is an island.” Indeed, the notion of “self” in creating industries is probably out-of-date in a world where everyone is multilayered in his/her mobility across borders, always connected to someone else thanks to information and communications technologies, embedded in multiple social networks and forums. Mark Granovetter (1985) argues in favor of the “strength of the weak ties” and about the potential influence of institutional frameworks to overcome great obstacles and achieve goals. The case of John Sperling (Apollo Group) provides a good illustration. Born to a poor sharecropping family, Sperling struggled in school because of dyslexia, however, with encouragement from some of his teachers, he was able to graduate with a PhD from Cambridge University.

From an evolutionary perspective influenced by social Darwinism theories, the concept of the self-made man sees an individual’s success constrained by market, competitiveness and technological path dependency.

Conclusion and Future Directions

The most important feature of self-made men is their resilience. Self-made men are mobile, active, and ambitious. Knowledge is passion not learning. Having grown up in difficult circumstances, they are dedicated to modify their original attributions within a competitive culture that values only winners. The path of self-made men is non-linear. He (or she) is constrained by successive adaptations, challenges, breaks, which all together transform a captain of his own destiny into a tycoon, and vice-versa. They always try to be in full control of their destiny – personal or professional – and thus work harder, faster, and with greater efficiency.

To scrutinize the process of enterprise creation this model, it is essential to undertake face-to-face interviews (prosopography) with several exemplars. Understanding the “bifurcations” in their lives is helpful; the life of a self-made man is made of such experiences. The setbacks and grief that he endures make him

bigger and helps him to marching onward (even if sometimes he cannot realize it in the moment). Then, success is measured not so much by the position that one has reached in life as by the obstacles that one has had to overcome while trying to succeed.

Cross-References

- ▶ [Entrepreneurship](#)
- ▶ [Innovator](#)

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Self-Regulation

- ▶ [Strategic Thinking and Creative Invention](#)

Sell-Off

- ▶ [Spin-off](#)

Semantic Survey

- ▶ [Two Hs from Harvard to Habsburg or Creative Semantics About Creativity: A Prelude to Creativity](#)

Semantic Technologies in Knowledge Management and Innovation

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Synonyms

[Innovation management](#); [Knowledge in innovation](#); [Technology impact on innovation](#)

Introduction

Innovation is one of the most decisive factors in gaining and attaining competitive advantage for an organization. Competition in globalized world requires rapid development and implementation of innovative products, processes and business models. In the innovation value chain knowledge is a primary resource and its effective integration, absorbency and use are imperative for attaining favorable outcome from the innovation process. In order to avail sustainable efficacy in knowledge amalgamation, synthesis and utilization organizations adopt technology to manage its knowledge related processes, procedures and routines. As a result, knowledge management is becoming a critical aspect in the organization's innovation strategy. At various nodes of knowledge management process use of semantic technologies allow substantial improvement in knowledge-related activities that in turn affect the innovation process and its outcome positively.

With the advent of new technologies, globalization and changing market conditions companies are facing heightened competition not just from industry peers but also from new entrants from other industries and geographical areas. In this changing environment where product and service life cycle are shortening in lighting speed, need for innovation is becoming a question of paramount importance (Drucker 2002; Tatikonda and Rosenthal 2000).

As a result, increasingly more company executives are accepting the fact that innovation is a critical component in their firm's success (Sawhney et al. 2006). Researches also posit that innovation capability is the most significant determinant of firm performance (Mone et al. 1998), and innovation is indeed a base for organizational survival (Hurley and Hult 1998). Moreover, a company's ability to innovate continuous is considered as a primary competitive advantage (Lengnick-Hall 1992). Consequently, for the firm the question is no longer why to innovate but how to improve its innovation capabilities and how to continue innovating in a faster speed.

One of the most vital resources for innovation is knowledge. Innovation depends essentially on access to the right knowledge at the right time. However, tapping into the available knowledge resource with its expanding boundary and depth is becoming increasingly difficult. Recognizing the complexity of this problem of controlling knowledge resource effectively, firms adopt various knowledge management strategies. In the case of innovation, knowledge management is not only capable of managing existing knowledge as a contributory input to the innovation process but also enables managing knowledge that is created in the innovation process (Cavusgil et al. 2003).

While knowledge management is the mechanism and systematic approach of managing knowledge, the information technology based infrastructure – Knowledge Management System (KMS) – is required to manage knowledge related routines, processes and procedures that focus on knowledge creation, aggregation, storage and distribution. Over the last 20 years or so, there have been many different strategies and information systems developed and implemented to maximize the productivity of knowledge workers and efficiency in the use of the knowledge available to the firm. To ensure the best result from a KMS, firms try and test advanced technologies when they become available. One group of cutting-edge technologies, Semantic Web Technologies (SWT), are increasingly becoming popular and

used by many KMS to manage knowledge activities including knowledge related to innovation.

Innovation

Ever since Schumpeter initiated the notion of innovation as an instrument for an entrepreneur to make sustainable change in the economy and defined it as the first introduction to a new product, process, method or system; (Schumpeter 1934) there had been many studies done on the various aspects of innovation from multiple angles. Even several decades before Schumpeter's seminal work, Veblen described similar concept in his book about leisure class. Although, he did not use the term innovation, he did mention about the importance of the processes related to technology shift and their impact on the economy and society (Veblen 1899). Since then scholars have defined innovation from various perspectives depending on their research focus, as a result, these definitions are also remarkably diverse.

In research literature, most definitions can be viewed from two-dimensional perspectives of innovation: innovation as a process and innovation as an outcome. From the process point of view innovation can be defined in a wider perspective such as "the process of bringing any new problem solving ideas into use" (Kanter 1984, p. 20). Defining innovation as a process gives an opportunity to study each of the innovation activities separately (Greve and Taylor 2000; Myers and Marquis 1969) and classify innovation from strategic points of view as closed or open innovation (Chesbrough 2003) and Continuous or discontinuous (Tushman and Anderson 1986).

On the other hand, from outcome perspective it can be defined as "An invention that has reached market introduction in the case of a new product, or first use in a production process in the case of a process innovation" (Utterback 1971, p. 77). The focal points of outcome perspective are the novelty and benefits of the innovation (Jaffe et al. 1993; Levitt 1960; Utterback 1971). The typology of innovation from outcome

perspective is categorized as product or process (Damanpour 1991), radical or incremental (Freeman 1974), disruptive or sustaining (Christensen 1997), and modular or architectural (Henderson and Clark 1990).

A possible working definition which covers today's context and based on Damanpour's original definition, is "Innovation is a creation and implementation or adoption of a new or modified device, system, policy, program, process, product, service, business model or strategy which produces social or economic value"(Damanpour 1991).

Innovation Process

Innovation is a non-linear dynamic process with various converging, diverging and iterative activities (Van de Ven 2007) over several stages that include multilevel acceptance, absorbency and refinement of knowledge, exploration of required knowledge and synthesis of knowledge.

The innovation value chain comprises of three stages: idea generation, conversion and diffusion. Ideation is the first step in the value chain, research and development along with a product or process development are the conversion process, and commercialization is the final stage (Hansen and Birkinshaw 2007).

An innovation strategy is necessary for the firm in order to start an innovation process that also works as a precursor to building awareness of a need or a problem to solve. The step of ideation within the innovation process is concerned about identifying one or several ideas than can create innovation opportunities. Since killer ideas are not often easy to get by the right idea has a tremendous impact on subsequent steps of innovation value chain. Girotra et al. (2010) offer four variables that influence the quality of best ideas: the quality level of ideas, the quantity of ideas generated, the quality diverseness of the ideas and the capability to identify the best idea. The sources of ideas could be in-house, from cross-pollination or external. Idea generation and evaluation are usually separated in order to maximize the amount of ideas. Management of

ideation stage includes activities such as idea generation, collection, evaluation, screening and ranking. The idea management process can be visualized as a funnel model, where a large number of ideas from multifarious sources after due evaluation transformed into a small number of potential concepts. These potential concepts create an innovation portfolio of projects that the firm maintains.

The innovation portfolio is vital for the success of a firm involved in innovation because a firm's efficacy in managing its R&D is one of the key factors in determining its competitive advantage (Bard et al. 1988). Innovation portfolio management is also necessary for risk aversion by diversifying risk as investment in innovation always carries some uncertainty (Bard et al. 1988) and for budgeting the resources for individual projects. The innovation portfolio deliverable is expected to be a precisely defined strategy along with a number of concepts that show the possibility of future success (Say et al. 2003).

Once a concept is identified as a viable innovation project the conversion stage starts. Project management in innovation cycle covers the processes that convert a concept to a marketable product and consists of linear, iterative and simultaneous activities (Adams et al. 2006). Innovation projects differ significantly from other organizational projects in their inherent risk of failure, nebulous nature of a preliminary concept that gets refined only after trials and tests, and difficulties in predicting eventual outcome. Effective innovation project management also requires use of knowledge-based tools and practices.

Diffusion is the final stage of the innovation value chain. In the book "Diffusion of Innovation," Everett Rogers (1995, p. 35) defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system." For the firms if the purpose of innovation is to develop and market a product, it entails the process of marketing and commercialization.

Knowledge and Knowledge Management

Innovation by nature is highly knowledge intensive (Kanter 1988), and knowledge is a critical component of a firm's innovation strategy (Dougherty 1992) and innovation process (Hull 2000). A firm's capabilities to combine its organizational dynamic capabilities with future potential of a technology by applying existing knowledge allow the firm to develop new applications from prior knowledge (Kogut and Zander 1992, p. 361). Grant argues that to improve the efficiency and quality of a number of organizational processes it is necessary to understand how knowledge integrates and flows throughout the firm (Grant 1996). He also stresses that firm's competitive advantage and operational success largely depend on its ability to identify, integrate and utilize knowledge successfully (Grant 1996; Volberda 1996; Zahra and George 2002). Indeed, the better is the sharing, learning, absorbing and overall flow of knowledge within various parts of an organization and with external sources the more chances of new knowledge generation and creation of new combinations (Birkinshaw et al. 2008; Tsai 2002; Inkpen 1996).

According to Walsh and Ungson (1991) knowledge resides in five venues of an organization: people, roles and organizational structures, operating procedures and practices, culture, and the physical structure of the workplace. The knowledge which is general, conventional and easy to express in commonly comprehensible language and possible to share, codify and convert as principles, formulae, data, processes and information is called explicit (Polanyi 1958; Nonaka and Takeuchi 1995). Explicit knowledge is easy to access and transfer and also refer as "knowing about," subjective or declarative knowledge (Kogut and Zander 1992). Although, it is a necessary prerequisite for innovation and value creation, unless protected by patents, copyrights or vigilantly guarded, it is also easy for competitor to imitate and any competitive advantage gained from using explicit knowledge in innovation as a result becomes short-lived (Dierickx et al. 1989).

The knowledge embodied in people learnt from experience, insights, heuristic procedures etc. that are difficult to express and codify in a manner so that it could become transferable is called tacit knowledge (Polanyi 1958; Reed and DeFillippi 1990). Tacit or unarticulated knowledge is more personal, experiential, context-specific, and hard to formalize (Saviotti 1998; Leonard and Sensiper 1998).

While some tacit knowledge is impossible to pass on due to their extreme stickiness (Szulanski 1996) most tacit knowledge can be disseminated by socialization – apprenticeships, dialogues and observations (Von Krogh et al. 2000). At an organizational level tacit knowledge is present not only in an individual; it is also available in the processes, culture and values. Since tacit knowledge is not easy to aggregate or disseminate and it embodies the knowledge, which creates sustainable competitive advantage in part through innovation, managing this type of knowledge is of utmost strategic importance for a firm (Grant 1996).

Organizational knowledge literature also specifies that knowledge is a key strategic asset and firms have to learn how to manage effectively this resource in order to stay profitable (Bollinger et al. 2001). Moreover, failure to create, integrate, manage, and use the knowledge endemic to the firm and acquired from exogenous sources may cause demise of the competitive advantage of the firm (Alavi et al. 2001). The importance of knowledge in a firm was clearly noted by renowned management guru Drucker as he declared that knowledge is the only resource for sustainable competitive advantage (Drucker 1993).

There are two categories of knowledge activities: Knowledge exploration and knowledge exploitation (Levinthal and March 1993; Choo and Bontis 2002). Both activities are vital in firm's innovation process. Exploration provides the new knowledge that can be used in combination with the existing one to create a knowledge base for innovation in new areas. Exploitation of this knowledge, on the other hand, creates the economic value (Zack 1999).

These two broad categories encompass a large number of different processes: knowledge creation, identification, integration, acquisition, sharing, storage, and replication (Edvinsson and Malone 1997; McNamara 2000). Knowledge management strategy at corporate level is a balancing act of these processes. Depending on the set goals of innovation and knowledge creation, emphasis is given on certain processes more than others (Hansen, et al. 1999; Revilla et al. 2009; Bierly and Chakrabarti 1996; Gupta et al. 2006).

Knowledge management is the mechanism and systematic approach of managing an organization's tacit and explicit knowledge. It refers to the processes and practices through which the firms generate value from knowledge (Gold et al. 2001). This means to acquire, store, deliver and use knowledge in a manner so that the knowledge can be accessed, developed, shared and distributed whenever is necessary in order to create sustainable competitive advantage. The processes mentioned are key components of knowledge management (Alavi et al. 2001).

Researches confirm that knowledge management is highly interlinked with process innovation, and knowledge acquisition, use and other knowledge related activities work as an enabler of improved coupling connection between new knowledge creation in innovation and firm's existing knowledge (Jang et al. 2002).

Although, successful knowledge management depends on several factors such as leadership, culture, structure, roles and responsibilities, technology and measurement (Hassanali 2002; Liebowitz 1999). One of the most vital components of knowledge management is information technology. In reality, the advent of new technologies in early 90s has given the true impetus to widespread adoption of knowledge management including in innovation life cycle.

Knowledge management system (KMS) is the Information technology based infrastructure to manage knowledge related routines, processes and procedures and focuses on knowledge creation, aggregation, storage and distribution in order to facilitate innovation and other activities that bring economic value to the firm.

Semantic Web Technologies

Semantic Web, which is a logical extension of the existing World Wide Web, aims to provide a common framework that would allow data to be effectively found, processed and integrated by software agents thanks to the underlying semantic description of the content (Berners-Lee et al. 1999, 2001).

The semantic web has evolved from fundamental conceptual ideas like a need to simplify the perception of complex realities surrounding us with the help of abstract terms, an endeavor to build a machine that can reason and take decision based on available knowledge and a seamless ability to aggregate, store and diffuse knowledge whenever necessary (Hitzler et al. 2010). Although, between semantic web technologies and semantic technologies there are some differences for the purpose of this paper these differences are not substantial. Hence the terms are used interchangeably.

While the scale and the domains of challenges are different, Semantic web in a bigger context is set to resolve some of the very similar issues that KMS faces:

- The need to assign data with semantic meaning and formalize the information derived from the data in significant way.
- To have intelligent agents that can examine the data, evaluate consistency, aggregate and extract new knowledge.
- To deliver best available answers based on natural language query.
- To define who may access what part of the information (Grigoris et al. 2008).

Semantic technologies are increasingly used in various KMS applications. Some examples are: Data aggregation from multiple external and internal organizational sources in varied formats, ontology based document categorization, application to assess the quality of data, queries using natural languages, transforming information into business intelligence, etc. (Schäfermeier 2010; Feigenbaum et al. 2007).

Semantic technologies in KMS can produce positive impact on the company innovation processes. Within the innovation life cycle

companies often encounter problems related to effective collaboration of geographically disperse teams, access to precise and adequate amount of information and just in time learning. KMS with semantic web technologies eliminate and reduce many of these issues allowing improved innovation processes.

In knowledge-based economy KMS is intertwined with the organizational resources, capabilities and strategies. KMS with semantic web technologies not only contributes in cost reduction, increased knowledge reuse, better decision making, faster flow of knowledge, rapid product development, effective collaboration, better customer service, it also brings much needed strategic flexibility to a company in order to maneuver in competitive environment.

Many knowledge repositories of organizational KMS have accumulated a vast array of information. However, in most firms a considerable portion of the valuable knowledge in the repositories is unstructured, unevaluated, and scantily accessible. The Semantic technologies are transforming organizational databases to true knowledge base by providing: globally unique names through the Uniform Resource Identifiers (URI's), semantic based languages such as the Resource Description Framework (RDF), RDF Schema (RDFS) for modeling data, the Web Ontology Language (OWL) for developing ontologies and a standard query language – SPARQL for research purposes (Hitzler et al. 2010; Kashyap et al. 2008). With the help of these and other tools and technologies knowledge-intensive firms are addressing the issues of content organization, archiving, displaying and finding quite successfully.

Within the organization's KMS ecosystem, there are various tools and applications that can make substantial positive impact on innovation processes if deployed with semantic technologies. Some of them are outlined here:

Knowledge Repositories

Knowledge repository is an integral component of a knowledge management system. Organizations are implementing repositories from the early days of KMS as a part of their knowledge managing strategy. A knowledge repository at

organization's level is a digital database of articles, whitepapers, best practices, business intelligence reports, customer related information, various company domain related materials and others. Although, most knowledge intensive firms incorporate digital repositories for knowledge management, success varies widely depending on the company strategy, information technology used and prevailing company culture (Davenport and Prusak 2007). The barriers to successful use include general reluctance of some workers to access the repository before taking business decisions (Haansen and Haas 2001), difficulties in finding required information, unstructured representation of the needed knowledge and lack of informal knowledge in the repository. According to Bhatt, if the knowledge available to the firm is not easily accessible in user-friendly format, it is difficult for the firm to keep its competitive edge, creativity and innovativeness at the right level (Bhatt 2001). A semantic knowledge repository based on ontology and semantic web agents could have necessary elements to overcome these hurdles.

Information Integration

One of the biggest impediments to the effective use of the early KMS was the issue related to integrating information to knowledge repository. In early days of KMS deployment, it was difficult to convince the workers to participate actively in adding information to the KMS (Haansen and Haas 2001). The key to resolving this problem was to embed integrated application into the job process itself. While formalized information like patients record, supply chain documents, database input etc. is easy to integrate the problem still remained how to add unstructured, spontaneous data and multimedia information in a way so that these data could be a meaningful part of the knowledge base. The solution is to provide the data with semantic annotation and use semantic inference engine to retrieve the data from ontology based knowledge repository.

Automated Decision-Making Applications

Firms generate and store a large amount of information each day and often require taking

real-time decisions based on these data. In innovation process often it is necessary to have access to this information in tailored format.

Semantic decision making applications help producing business intelligence and making subsequent decisions by analyzing and synthesizing information from disperse locations and multifarious formats.

Semantic Innovation Portal

Firms can improve the effectiveness of innovation KMS by integrating an innovation portal that provides range of knowledge, moderated access tool to classified knowledge and other permission-based application from one single online space.

Virtual Community Support System

Nonaka often referred to a subtle concept under the name "Ba," which was first proposed by the Japanese Philosopher Kitaro Nishida. The underlying idea of this concept points to a place, which facilitates generating new knowledge through interactions and sharing of implicit and explicit content by participants. Semantic social network platform is a virtual community support system surrounding content where organization's members can participate, collaborate, and create new knowledge. This virtual community should be an integral part of any KMS. It is a highly similar concept that Nonaka propagates as "Ba" (Nonaka and Takeuchi 1995).

E-Learning

Knowledge absorptency capability of the innovation team members is crucial for further knowledge integration. This capability is based on existing knowledge of the firm and individual innovation team member. Absorptive capacity is also equated to a firm's innovative capability and this is seen as a function of prior knowledge (Cohen and Levinthal 1990).

One of the biggest challenges for organizations is how to deliver necessary knowledge for learning to the employees just in time as per individual's requirement. E-learning applications based on semantic technologies facilitate

creating and delivering information tailored to user's need with highly intuitive teaching mechanism.

Ontology

Ontologies are fundamental attributes of the semantic technologies. Ontology is an explicit specification of a conceptualization. Natural language is full of ambiguous words. A single word in various contexts might mean different things. For a program to identify similar terms from two different databases it needs to have a mechanism that specifies the domain of the context. This specification of domain defines the terms and their properties. The collection of information that resolves this issue is called ontology. Ontologies with metadata are essential tools to systematize and supply constructive descriptions of diverse arrays of content. A typical ontology is a document that consists of taxonomy and related inference rules. Semantic KMS repository uses ontologies as a key structural layer and fundamental concept for the repository system (Guarino 1998).

Conclusion and Future Directions

Semantic technologies are still situated at nascent stage of development. While in this article the focus was, in particular, use of semantic technologies on innovation process through improvement of knowledge related activities, semantic technologies are already powering systems targeted in resolving pressing issues that business world is presently facing such as cloud, big data, predictive analytics, social network, and other areas.

Gartner (2007) predicts that mainstream use of semantic technologies will go through various evolutionary steps and a transformation of the Web itself in terms of semantic environment will take place by 2027. Semantic technologies in searching, extracting, aggregating, storing, disseminating knowledge and semantic modeling, reason and analysing applications are already being used in the fields such as social networks, 3D technologies, mobile technologies, NFC and

RFID, and new media technologies, and helping develop new products, processes, programs and apps. This process will continue in accelerating speed in coming years resulting innovations in vital areas of knowledge economy affecting health care, media, organizational management, entertainment, energy and education.

Cross-References

- ▶ [Antitechnology Movements: Technological Versus Social Innovation](#)
- ▶ [Art of Innovation: A Model for Organizational Creativity](#)
- ▶ [Ideas and Ideation](#)
- ▶ [Knowledge Capital and Small Businesses](#)
- ▶ [Product Innovation, Process Innovation](#)
- ▶ [Techno-globalization and Innovation](#)

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Simplexity Thinking

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Introduction

Rapidly accelerating societal and economic change is posing new, more complex challenges for management researchers seeking to improve organizations. Many organizations that prospered during more stable times – times that rewarded routinized efficiency – now find themselves poorly adapted to today’s new economic and social realities. In every direction, traditional structures are abruptly being reshaped or falling down. Once successful companies are finding that their sure-hit formulas no longer work. Long revered icons of organizational excellence have been humbled, and even bailed out of bankruptcy and imminent demise by government intervention. Individuals, families, and entire communities are finding the world shifting beneath their feet as traditional markets, industries, and sources of employment disappear under the impact of new information technologies, global competition, lack of regulation of financial institutions, uncertainty about global warming, transitioning to new energy sources, and a restructuring of the world economy. It is not surprising that organizations whose main virtues during previous times were predictability and reliability should find it difficult to adapt to this increasingly dynamic environment. Their employees, too, are struggling to deal with these changing times as the vast scale of change has resulted in an unprecedented need for information processing and problem-solving skills. There has been a dramatic increase in psychological

research aimed at better understanding the cognitive capabilities of employees, in order to improve employee productivity and well-being (Hodgkinson and Healey 2008).

This entry addresses the need for organizations to develop more innovative ways of thinking and behaving in order to succeed in a turbulent world. While many organizations possess ample efficiency and analytical capability, successful organizations must also learn to integrate effective adaptability and creative capability into their repertoire. Creativity attitudes, behaviors, and cognitive skills, embedded into a specific organization-wide problem-solving process, must be learned, and developed such that they are second nature if organizations are to survive and thrive. Innovative thinking ability must be made a way of organizational life, side by side with analytical thinking ability, not as a “sometimes thing” or “once in a while thing.” Research has established that efficiency and adaptability are both necessary for organizational effectiveness (Mott 1972). Operationalizing adaptability can be achieved through Simplexity Thinking, a system comprised of a number of attitudinal, behavioral, and cognitive skills embedded within a multistage problem finding, defining, solving, and implementing creative process. This system does not exclude analytical thinking and analytical tools; on the contrary, it is clear that organizational creativity competency enhances and complements incumbent analytical capabilities. One of our goals is to help the field of creativity become better understood in its applicability to real world work, rather than a discretionary, once in a while add-on.

In management research up until the late twentieth century, the primary determinant of a firm’s performance was perceived to lie *outside* the firm; that is in its external environment. This was the standard industrial organizational (IO) neo-classical economics viewpoint (Porter 1980a, b; Caves and Porter 1977; Caves 1980). In other words, according to the IO perspective, the source of a firm’s profits was ultimately determined by its market position and the structure of the industry to which it belonged, and protected

by barriers to entry into the market. This perspective led to the notion that leaders need only to design appropriate organizational structures and continue to make well-reasoned decisions (Edmondson 1996) in order to achieve continued economic success. An opposing point of view perceives that the source of superior profitability lies *inside* the firm. Known as the resource-based view, this perspective regards the firm as a bundle of resources not dependent on external market and industry structures (Ambrosini 2003; Rumelt 1984; Amit and Shoemaker 1993). It suggests these resources – primarily the people of the firm – are responsible for a firm’s sustainable competitive advantage, as they are capable of adapting to changing external circumstances. The resource-based approach of Simplicity Thinking focuses specifically on the capability of the people inside the firm to use their creativity to deliberately and proactively make valuable changes internally or externally, and adapt to new situations that arise, in order to continuously develop and sustain healthy profitability. One well-cited example of this is how Southwest Airlines, which is famous for its people-centered management style, continued to be profitable in the post 9/11 period while most US airlines went into near or full bankruptcy.

Organizational Effectiveness, Adaptability, and Creativity

Research has shown that effective organizations have two major but very different characteristics: efficiency and adaptability. Efficiency means perfecting routines in order to attain the highest quantity and quality for the lowest possible cost. High efficiency means mastery of routine, or standard, prescribed methods by which the organizational unit carries out its main tasks. The efficient organization follows well-structured, stable routines to deliver its products or services in high quantities with high quality and at low cost. On the other hand, adaptability means continually and intentionally changing routines and finding new things to do and better ways to do current work. Adaptability means scanning the environment to

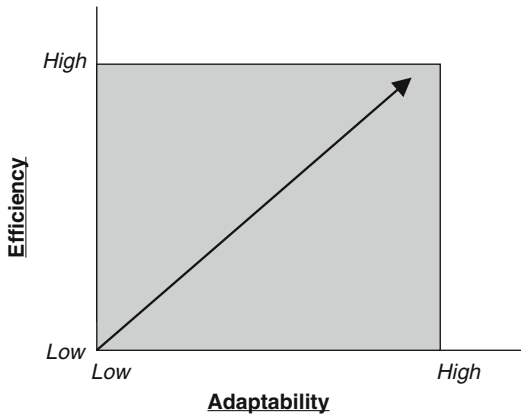
anticipate new opportunities and problems and deliberately changing methods in order to attain new levels of quantity, quality, and cost. Adaptability yields both new methods and new products and services. High adaptability means a high rate of positive change of routine.

In a stable world, efficient organizations may be successful. But in today’s changing world, organizations need adaptability. While efficiency implies mastering routine, adaptability means mastering the *process of deliberately changing* internal and external environments. Adaptable organizations anticipate problems and opportunities, and develop timely solutions and new routines. The people in such organizations accept new solutions promptly and the acceptance is prevalent across the whole organization. While adaptability is a *proactive* process of looking for ways to change, efficiency includes *reacting* quickly to unexpected turns of events and maintaining routines with minimal disruption and without getting mired in organizational bureaucracy. According to Mott’s research (1972), the most effective organizations are both efficient and adaptable simultaneously, while the least effective organizations lack the right amount of either or both attributes. The following equation summarizes the findings:

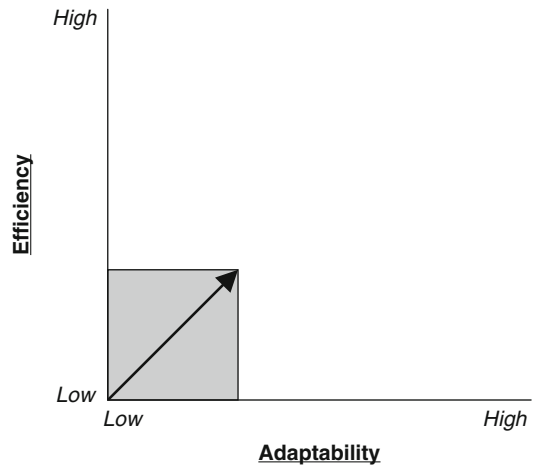
$$\begin{aligned} &\text{Organizational Effectiveness} \\ &= \text{High Skill in Efficiency} \\ &+ \text{High Skill in Adaptability} \end{aligned}$$

High skill in adaptability (or efficiency) means the ability to implement higher or lower levels of adaptability (or efficiency) performance as desired (Fig. 1).

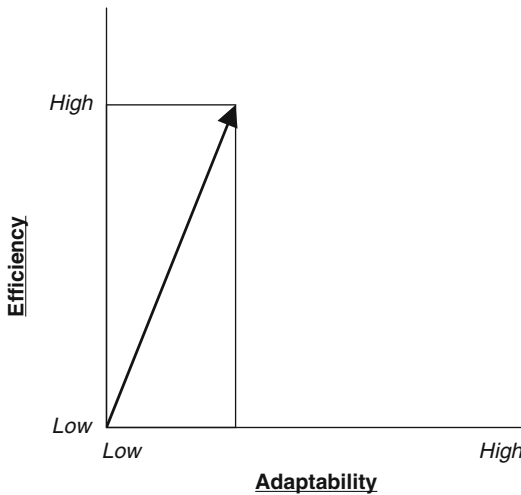
Through the years, many organizations whose success was built on predictable technologies, markets, or other environmental factors learned to become highly efficient but neglected to build capacity for adaptability (Fig. 2). For example, prior to the 1970s, North American consumers bought almost all of their cars from one of the Big Three domestic automakers. American automakers became accustomed to building large, fuel-inefficient vehicles suitable for a stable



Simplexity Thinking, Fig. 1 Balance of efficiency and adaptability appropriate for a rapidly changing, unstable environment



Simplexity Thinking, Fig. 3 Balance of efficiency and adaptability inappropriate for any environment

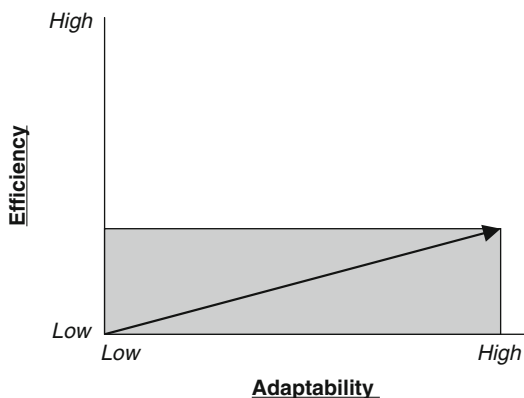


Simplexity Thinking, Fig. 2 Balance of efficiency and adaptability appropriate for a predictable, stable environment

environment in which fuel was plentiful and inexpensive. Industry innovation was largely limited to cosmetic style changes each model year (low adaptability). As a result, when Japanese automakers began introducing more reliable cars, better options, and smaller vehicles that addressed new problems such as the 1970s oil crisis, they were quickly able to take advantage of the lack of attention the Big Three had paid to both efficiency and adaptability (Fig. 3).

A similar story can be told about the North American tire industry during the same time period. The radial tire introduced by France’s Michelin in 1945 was displacing the bias-ply tire everywhere but in North America. Until about 1975, North America’s automotive tire industry enjoyed a predictable environment. Consumers bought their tires every 20,000 miles or so from Goodyear, Firestone, or any of their well-known competitors. With the tires basically of the same quality, consumers shopped for the best price and friendly service and suppliers concentrated on providing these efficiency factors (Fig. 2). However, by failing to adapt to the radial tire innovation, due to management resistance, much of the North American market was lost virtually overnight to Michelin and Japan’s Bridgestone, which found a public receptive to the advantages of the new tires. For the North American suppliers, what had appeared to be a predictable environment became anything but. They should have been operating according to Fig. 1; instead they were operating according to Fig. 2 (efficient enough but not adaptable enough).

It is also possible for an organization to be too adaptable but not efficient enough (Fig. 4). Some highly successful organizations – such as 3M, which is famous for continuously creating new products – carefully monitor their own activities so as not to overemphasize adaptability at the



Simplexity Thinking, Fig. 4 Balance of efficiency and adaptability overemphasizing adaptability at the expense of efficiency (inappropriate except in the most extremely unstable, unpredictable environments)

expense of efficiency (which would be an appropriate balance only in the most extremely turbulent environment). Microsoft has been criticized for introducing new products too hastily, before ensuring they have been optimized and are error free. Mediocre organizations compromise unnecessarily, trading off efficiency against adaptability in a zero-sum fashion. However, the most effective organizations ensure they have the right amount of both efficiency and adaptability. In today's highly competitive North American car market, many companies – North American, Japanese, and German – stress both high efficiency and high adaptability. Their consumers demand high levels of both quality and innovation. In a rapidly changing, unstable environment, both high efficiency and high adaptability are necessary (Fig. 1).

While all organizations need skills in both efficiency and adaptability in order to be effective, most organizations understand the concept of efficiency and find it easier to mainstream than that of adaptability. One of the most important factors in determining the appropriate ratio between efficiency and adaptability is the volatility of an organization's environment.

Early approaches to improving organizational effectiveness by researchers and practitioners centered on embedding humanistic ideals and values, including personal development,

interpersonal competency, participation, commitment, satisfaction, and work democracy (French and Bell 1999; Mirvis 1998), into the workplace. These approaches became part of a field known as “organizational development,” which has evolved adding interventions almost too numerous to mention.

Many of these interventions have been useful in improving organizations in the short run. But many seemingly successful and permanent changes regress or disappear within a relatively short time after their implementation. This is sometimes called the fade-out effect (Hinrichs 1978). The specific intervention called total quality management (TQM) has often failed to live up to expectations (Spector and Beer 1994), partly because it has often been introduced as a grab bag of tools (and management rhetoric) without any change-making skills or process (Basadur and Robinson 1993). However, TQM has succeeded when installed not only as a tool (intervention), but as part of a continuous process of change making supported by a comprehensive, well-planned system of skill training, additional tools, management leadership, and employee engagement toward well-understood, specific, strategic goals (Basadur and Robinson 1993). Top managers must look at what they practice versus what they preach. If they truly want change, they must become proficient in change making. One of the most obvious examples of the lack of understanding of change making among managers is the inconsistency between organizational rewards and desired behaviors (Kerr 1995). Table 1 details these examples.

While creative strategies abound, many organizations struggle to effectively translate those strategies into action because employees are not sufficiently equipped to respond in ways that yield positive individual and collective outcomes (Hodgkinson and Healey 2008). Discrete interventions and tools continue to be the mainstay of organizational development work, with interventions perceived as the activities “through which changes in elements of an organizational work setting are implemented” (Robertson et al. 1993).

Simplexity Thinking, a process of organizational creativity with embedded creativity skills

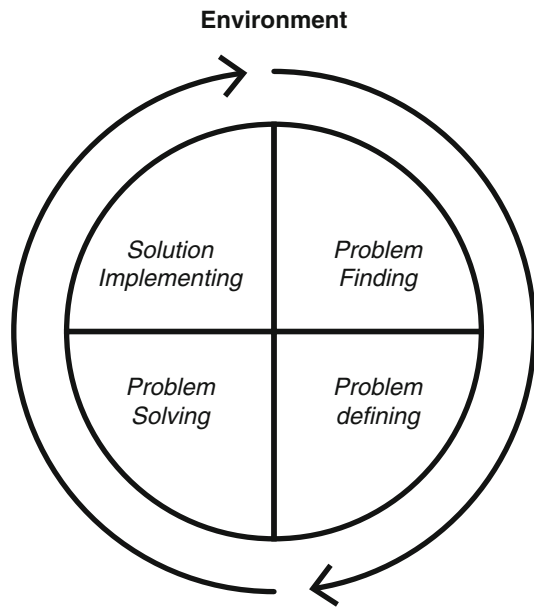
Simplexity Thinking, Table 1 Examples of inconsistencies between desired behaviors and reward systems

We hope for.....	But we reward....
Long-term growth; environmental responsibility	Quarterly earnings
Setting challenging “stretch” objectives	Achieving goals: “making the numbers”
Commitment to total quality	Shipping on schedule, even with defects
Teamwork and collaboration	The best team members
Innovative thinking and risk-taking	Proven methods and not making mistakes
Development of people skills	Technical achievements and accomplishments
Employee involvement and empowerment	Tight control over operations and resources
High achievement	Another year’s effort

at all levels and across all disciplines, can be used to effect ongoing change making as an everyday way of life. Very importantly, it requires equipping internal organizational members with the ability to apply the process and skills for self-sufficiency, that is, without interventionist help from the outside. In this approach, change making is a continuous process of finding and solving problems and implementing solutions, which is synonymous with the Simplexity Thinking process. Without a precise change-making process that people can follow, and the necessary attitudinal, behavioral, and cognitive skills needed to make the process work, organizations cannot mainstream adaptability, that is, make it an ongoing routine way of organizational life.

Simplexity Thinking: A Specific Method of Operationalizing Adaptability

Simplexity Thinking can be defined as a system of knowledge, process, skills needed to make the process work, tools (e.g., creativity techniques such as brainstorming), and appreciation of process style differences (Basadur and Gelade 2006). Unlike traditional OD approaches, which lack a strategic perspective and rely on single or



Simplexity Thinking, Fig. 5 Creative activity in an organization

multiple interventions to change making, Simplexity Thinking is comprised of employees at all levels, highly skilled in constantly executing a process of finding relevant internal and external problems, strategic and tactical, solving them, and implementing the solutions for organizational adaptability. In effect, this defines Simplexity Thinking as “implemented change.” The most effective organizations know that creative attitudes, behaviors, and cognitive skills and a creative process are necessary for successful sustained implemented change (Kriegesmann et al. 2005). Real sustained organizational change comes as a result of a structured process of applied creativity and attitudinal, behavioral, and cognitive skills employed by organizational members and modeled by leadership.

Studying and discussing creativity can be quite difficult and complex, because no single, agreed-upon definition of this quality exists and because researchers have taken vastly different approaches to its understanding. We focus on demonstrating a circular process of creativity as part of a continuous system of adaptability (Fig. 5). We have chosen to describe creativity in organizations as a continuous process of

deliberate problem finding, problem solving, and solution implementation (Kabanoff and Rossiter 1994) and attitudes, behaviors, and cognitive skills that enable the process to work (Basadur et al. 1982; Basadur 1994a). Problem finding means continuously finding new problems to address. This includes addressing things that are going wrong, but also anticipating and seeking out current or future changes, trends, challenges, and opportunities. Problem finding also includes taking the time to explore problems in depth rather than merely finding quick solutions or “fixes” (Senge et al. 1994). This permits the discovery of not only underlying issues but also new opportunities and recognition of the interconnectedness of decisions within the organization. This recognition is the essence of systems thinking and the starting point for making long-term, permanent improvements. Problem solving means developing new and useful solutions to identified problems. Solution implementation means making new solutions succeed. Implementation usually leads the organization to find new problems to solve. As Runco (2004) noted, creativity is not only reactive – a response to problems and challenges – but also proactive, as a contributor to change. Thus new problems arise as the system and its environment react to each newly implemented solution. Therefore, organizational creativity can be understood as the fundamental driver of, and virtually synonymous with, adaptability, including a circular process of continuously finding, defining, and solving important problems and implementing new solutions which represent valuable changes that enable the organization to succeed (Fig. 5).

This approach also removes any distinction between creativity and innovation (despite views of some researchers who distinguish between creativity as the generation of an idea and innovation as its implementation). Here, creativity is defined as a multistage complete and continuous process driven by attitudinal, behavioral, and cognitive creativity skills in each stage, including problem generation and formulation, idea (solution) generation, and solution implementation. This inclusive process is described as Simplicity Thinking.

In addition, there are various creativity tools which can be applied in the various stages. However, such tools are of little value, and may even be harmful, without the prerequisite creativity skills to apply them. An example of such a tool is “brainstorming” which is frequently misused due to lack of skill and misunderstanding by researchers who lack experience in real world situations (Basadur and Basadur 2009).

Effective organizations know how to establish a well-understood process and set of skills for adaptability. They do not expect adaptability to be achieved without effort. For example, 3M sets a corporate objective that every 5 years, 30 % of their products must be new. Effective organizations also create a positive climate toward problems and seek them out as opportunities for disruptive change (Mott 1972). As solutions are implemented, new problems (or opportunities for innovation and improvement) are discovered. For example, Basadur (1992) reported that top Japanese corporations place newly hired R&D scientists and engineers into sales departments to begin their careers. The intent is for them to learn experientially the problems of the customer, and recognize that such learning is the beginning of innovation. Thus, a positive mindset toward creativity begins with a positive attitude toward *problem finding*, meaning the behavior of continuously and deliberately discovering and formulating new and useful problems to be solved.

The Four Distinct Stages of the Simplicity Thinking Process

The evolution of models of multistage creative thinking and problem-solving processes began with Wallas’s (1926) four main stages: preparation, incubation, illumination, and verification. Later process models incorporated additional stages, but all include, as a first step, a process in which a problem is recognized, identified, and constructed (Reiter-Palmon and Robinson 2009). This is where the problem is formulated. However, all the preexisting models tend to assume that a problem, task, or goal requiring creativity

already exists or has been presented and that a creative process is subsequently applied. This reduces these models to mere tools, or problem-solving interventions or episodes which start with a problem and end with a solution. A more complete process of creativity begins before a problem is available to be formulated (Basadur et al. 1982, 1990). Figure 5 outlines a continuous circular process that begins with the deliberate seeking out (*generating*) of new problems and opportunities. The second stage of the process is *conceptualizing*, or formulating, defining, and constructing a newly generated problem. In the third stage, *problem solving*, evaluation and selection of solution ideas takes place, while the fourth stage results in *solution implementation*. The process then begins anew, as every implemented solution (action) results in the opportunity to discover (generate) new problems and opportunities. For example, the automobile's invention provided not only a new solution to an old problem (improving transportation) but created many brand-new problems (e.g., pollution, energy, and accidents). Each stage of the process requires specific attitudinal, behavioral, and cognitive skills in order to be successfully completed.

While effective innovation requires strong performance in each of the four stages of the creativity process, research has found that individuals, teams, and organizations may prefer some stages of the creative process more than others. Effective leaders must learn to synchronize these different creativity preferences or *styles* (Basadur 2004). In teams, for example, the members must learn to combine their individual preferences and skills in complementary ways. Basadur and Head (2001) showed that heterogeneous teams composed of people with different preferences outperformed homogeneous teams whose members had similar preferences.

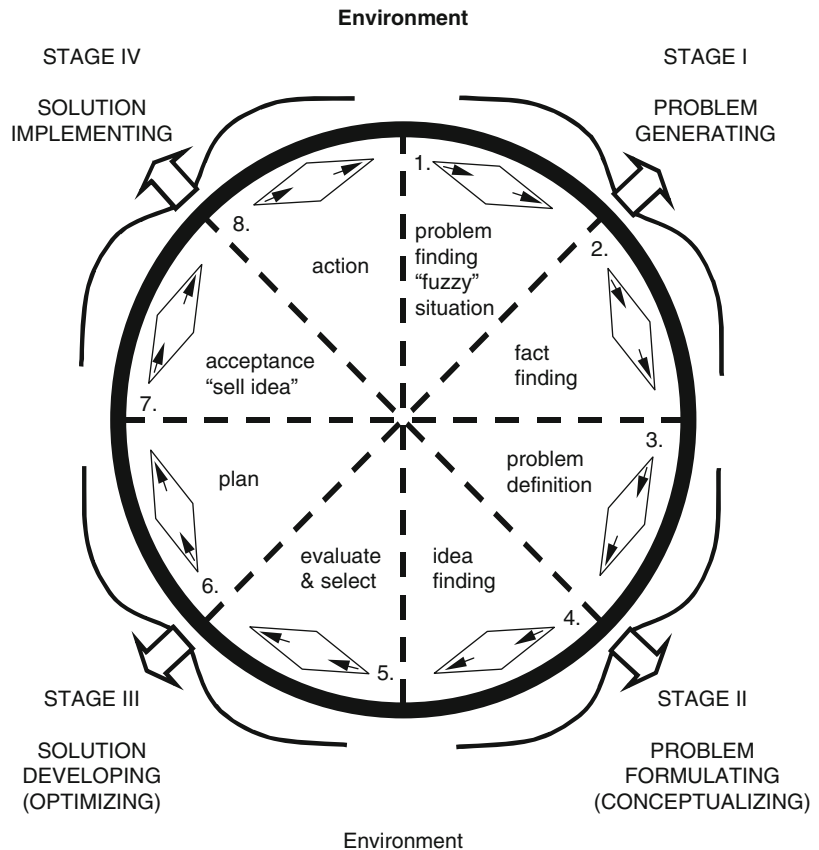
How Organizations Can Become Skilled in Simplicity Thinking

Many shortcomings in attitudinal, behavioral, and cognitive creativity skills plague individuals,

teams, and organizations. As detailed in Basadur (2004), for many individuals, problem finding is a foreign concept. Many people wait for others to find problems to solve rather than actively seeking out problems, or avoid important problems that cross departmental lines (“That’s not our problem”). Conceptual skills in defining problems are lacking and much time is wasted “working on the wrong problem.” Even after finding and defining problems, some people find it difficult to solve them creatively and imaginatively. Some individuals are also critical of new ideas, which can prevent productive thinking. While many people may be able to implement routine solutions to routine problems, few can implement creative solutions to new, non-programmed problems. Teamwork is also often uncreative. Group members are unable to communicate clearly in simple terms, for example. Unaware of variations in individual thinking styles, groups fail to synchronize these differences, jump into “solving the problem” without first considering what the real problem is, and then flounder. Inter-functional teams become stalled arguing about territorial issues. Meeting leaders steer toward their own points of view rather than facilitating the group to work openly and cohesively. The design of many organizations remains along bureaucratic, functional lines – a design that itself minimizes creativity. Jobs are programmed for maximum control, highest quality, and lowest cost per unit. Creativity skills and change making are limited to short-term quick-fixes during emergencies. For organizations without a positive mindset toward creativity, problems and changes stemming from new technology, customer tastes, and foreign competition are viewed as irritants that disrupt well-functioning, established routines, despite the fact that the essence of adaptability and the first phase of the creative process is problem finding. Basadur et al. (1982), demonstrated that many of these shortcomings can be overcome by developing specific skills. Training to build these skills is based on two central concepts.

1. **Change making is a process with distinctly different stages:** In practice, it is useful to break the four-stage change process shown

Complexity Thinking,
Fig. 6 The organizational
 change-making process



in Fig. 5 into a circular process of eight smaller steps as shown in Fig. 6. These steps include problem finding and fact finding, which collectively make up “problem generation,” or Stage 1; problem definition and idea finding (“problem formulation,” or Stage 2); idea evaluation and selection, and planning for implementation (“problem solving,” or Stage 3); and gaining acceptance and taking action (“solution implementation,” or Stage 4).

2. **An ideation-evaluation process occurs in each stage:** It is vital to use an ideation-evaluation mini-process within each of the eight smaller steps across all four stages as shown in Fig. 7. The mini-process is shown in Fig. 7.

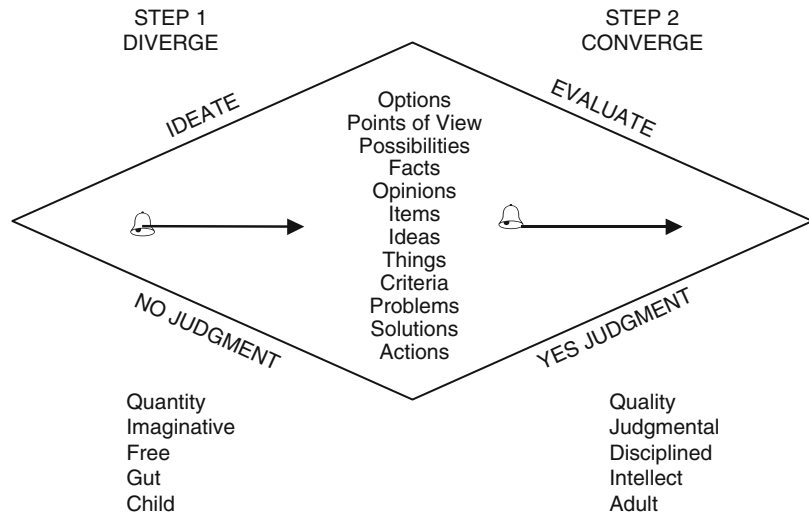
Three distinct skills are needed to execute this two-step mini-process effectively (Basadur and Finkbeiner 1985): deferral of judgment, active divergence, and active convergence. By separating divergent thinking from convergent thinking,

deferral of judgment resists the tendency to prematurely evaluate and select options, and encourages active divergence. Deferral of judgment also prevents people from leaping to solutions before properly formulating problems, and helps them separate assumptions from facts. Active divergence enables generation of many options without judging or analyzing them. Active convergence, which resists the tendency to linger in divergent thinking, then selects and acts on the options that ultimately lead to implementation of change. These three skills all have attitudinal, behavioral, and cognitive components.

Becoming Competent

It is much easier to understand the need for a systematic process to achieve organizational creativity and adaptability (as modeled in Fig. 6) than it is to become skilled in using such

Simplexity Thinking,
Fig. 7 Ideation-
 evaluation: A sequential
 creative thinking mini-
 process



a process. Learning how to use the process involves developing skills in finding, defining, solving, and implementing new opportunities. Most managers have undergone rigorous training in analytical, optimizing, and efficiency thinking processes in high school and college and on the job training. Creativity requires a different set of skills in which competency must now be built belatedly. Building competency has three main components:

(1) Competency in executing the process as a whole; (2) Competency in respecting and helping synchronize different styles in the process and (3) Competency in executing each step and stage of the process. Competency in executing the process as a whole includes being able to distinguish the different steps from each other; for example, executing, communicating, and separating (1) problem finding activity from (2) problem defining activity and from (3) solution development activity and from (4) implementing activity. It also includes avoiding unconsciously leapfrogging the process steps, such as jumping backward from discovering a fresh new problem (step 1) into immediate action (step 8) only to discover later that the problem was not what it seemed to be at all and regretting the time wasted by not permitting the process unfold naturally from 1 through 8.

Competency in respecting and synchronizing different process styles includes understanding

how the creative process depends upon different ways of apprehending knowledge and understanding and utilizing knowledge, however apprehended. Not only are both necessary for creative performance, but frustration and inefficiency in working together can be avoided. For example, if some individuals on a team prefer stage 2, conceptualization, while others on the same team prefer stage 4, implementation, it is important that these individuals understand and respect each others' opposite preferred ways of apprehending knowledge (experientially and concretely vs. theoretically and analytically) and of utilizing knowledge (to create options divergently vs. evaluate options convergently).

Competency in executing each step of the process includes competency in executing the ideation-evaluation mini-process described previously which combines the three necessary creativity thinking skills within each step: (1) creating options within the step (divergent thinking); (2) evaluating and selecting the most important options within the step (convergent thinking); and (3) skill in separating divergent from convergent thinking within each step (deferral of judgment). Integrated into early creative problem-solving theories and models, including Osborn (1953), Guilford (1967), and Parnes, Noller, and Biondi (1977), these skills in the mini-process have been more deeply explored in more recent empirical research which has

described them more completely and identified their attitudinal, behavioral, and cognitive components. For example, in a multi-method, multi-measure field experiment, Basadur et al (1982) identified attitudinal, behavioral, and cognitive effects of training which were readily observable back on the job (along with performance effects). The effects included:

- Attitudinal: More openness to new ideas; more positive reaction when confronted with new unusual ideas
- Behavioral: More likely to pause to try new, unusual approaches to solving problems; less time spent in negative evaluation while creating options; less likely to jump to conclusions as to the nature of the real problem
- Cognitive: Increased quantity and quality of options created; more time spent in divergent thought prior to evaluating; more options created prior to selecting one as best

Additional examples of the attitudinal, behavioral, and cognitive components of each of the three process skills throughout the complete eight step process are provided in Tables 2, 3, and 4 (Basadur and Robinson 1993; Basadur et al. 2000a, b). It should be noted that the examples below overlap a great deal across attitudinal/behavioral/cognitive distinctions and also across the three process skills distinctions.

The field research by Basadur et al (1982), provided evidence that unless creativity training was sufficiently impactful to successfully *unfreeze and change* participants, no improvement in creativity skills and performance would be achieved. In other words, to achieve meaningful increases in problem finding, defining, and solving, and solution implementation performance, the impact of training must be sufficient to increase acceptance and practice of the attitudinal, behavioral, and cognitive creativity skills within the multistage creativity process. However, their research also suggested that to *refreeze* the acceptance and application of the new skills built in training to on the job creativity performance, specific strategic structural organizational factors must be developed and put into place to reinforce and motivate their on the job practice (Basadur 1994b). Basadur, Graen, and

Simplicity Thinking, Table 2 Examples of deferral of judgment skill

ATTITUDINAL

Tackle problems with an optimistic “can do” attitude

Enter meetings open to ideas that might disrupt one’s own department’s routine

BEHAVIORAL

Visibly value, appreciate, and welcome other points of view

Avoid making premature, negative judgments of fledgling thoughts

COGNITIVE

Recognize hidden, unconscious, unwarranted assumptions

Maintain an awareness that some facts are more difficult to perceive than others

Understand that some problems require a longer time to solve, and do not expect immediate results

Simplicity Thinking, Table 3 Examples of active divergence skill

ATTITUDINAL

Deliberately push oneself to create unusual, thought-provoking ideas

Turn premature, negative evaluations of ideas into positive challenges to keep the creative process flowing; when others say “We can’t because . . .” counter with “How might we . . .?”

BEHAVIORAL

Show leadership in pinpointing changes, trends, problems, and opportunities for improvement throughout the organization

Share information and ideas freely with other people and departments

Share “bad news” as quickly as “good news” to aid organizational problem solving

Facilitate teams to formulate problems in ways that transcend departmental considerations

COGNITIVE

Search out many different facts and points of view before attempting to define a problem

Define problems in multiple and novel ways to get a variety of insights

Scandura (1986) found that the training effects in creativity process and skills as shown in Fig. 7 on manufacturing engineers persisted back on the job were more permanent when they were trained together in intact teams. Team members learn to accept and share their members’ diverse

Simplexity Thinking, Table 4 Examples of active convergence skill

ATTITUDINAL

Be willing to accept and participate in consensus decisions and move on in the change-making process

Accept ownership of measures of success of new ideas being implemented

Take the risk of failing or being criticized for implementing new ideas

BEHAVIORAL

Take reasonable risks to get action taken within time limits rather than waiting for the “perfect” option to emerge

Follow up on implementation; do whatever it takes to ensure successful installation of a chosen solution

COGNITIVE

Select, clarify, and focus on the most significant facts available prior to attempting to define a problem

Develop unbiased criteria for selecting from among options rather than letting preconceptions or hidden motives sway decisions

Understand how clear, simple, and specific implementation plans motivate action and overcome inertia

Understand the importance of including both long- and short-term decision-making criteria

experience more completely, support differing viewpoints, and risk implementing novel ideas (Basadur et al. 1982). This helps to avoid “group think,” the tendency for members to follow the crowd into inadequate solutions instead of offering possibly controversial, superior viewpoints. Applying the process makes participation in problem solving safe and fun because people no longer fear advancing fledgling points of view and do not feel they must be constantly on guard.

Getting Two for the Price of One

Organizations which provide the right skill training, create the right infrastructure, and participate in and reward continuous problem finding and solution implementing, achieve several outcomes. Some creativity outcomes are directly economically oriented and others are not. Creativity leads directly to new and improved products and methods; these are economic outcomes associated

with adaptability. However, creativity also leads to specific people outcomes, including motivation and commitment, which serve as intermediate steps leading to economic outcomes associated with efficiency (Basadur 1993).

Motivation and Commitment Are Outcomes of Creative Activity

Workplaces that establish adaptability as a daily, continuous process of problem finding and defining, problem solving, and solution implementation may experience increased employee commitment and motivation. Numerous research studies have shown that curiosity, activity, and exploration are intrinsically enjoyable and motivating. People develop negative attitudes toward repetitive tasks and experience fatigue and boredom. Permitted to engage in finding and solving problems, workers become motivated and desire even more participation in creative activity. They also work harder at perfecting their routine jobs to increase quality and quantity and reduce costs, thus increasing organizational efficiency and short-term organizational effectiveness. Workplace accomplishments improve self-esteem and human need for achievement, while creative activity stimulates team-building as people help each other to solve problems. Some research has also suggested people are more motivated to achieve goals that they have been given a chance to choose, which supports the importance of problem finding as an employee motivator, as well as an organizational necessity.

By giving employees the encouragement and opportunity to find and solve their own challenging problems, and implement their own solutions, organizations can provide intrinsically rewarding work and tap into the need for achievement for motivation.

Reducing Turnover, Absenteeism, and Increasing Personal Development

The link between inducing creativity on the job and increasing job satisfaction and commitment

is important not only from the perspective of having happier and more motivated people at work, but in other ways as well. Industrial and organizational psychology research has identified substantial correlations between job satisfaction and commitment and direct economic variables such as lower turnover and lower absenteeism (Locke and Latham 1990; Organ 1988). Other outcomes which are both people and economically oriented include better selection, placement, career planning, and personal development for organizational members. For example, if we understand peoples' unique individual thinking and creative problem-solving process styles better, we can match them with jobs better (Basadur and Gelade 2003).

Setting Up the Internal Environment to Encourage Creative Work

While the commitment of an individual is the prerequisite for the development of expertise, the study of expert performance acknowledges the support structure surrounding individuals as crucial to facilitating eventual success. In developing of the creative competency of employees, the internal environment of an organization and its managers must act like the coaches, teachers, and parents studied in athletic and artistic expert performance. While the motivation and drive of employees to develop creative thinking skills is critical, management must structure the environment so that it enables the continuous growth of employees' expertise, and leaders must monitor the performance of employees and instruct them using methods that challenge them to reach ever higher levels of competence.

Despite research showing that most people at work are multi-motivated, the majority of global business and industry is still organized and managed on the overly simplistic "scientific management" concept made popular in the early twentieth century by Frederick Taylor (1967). Taylor believed that employees are motivated by one dominant factor – money. Fortunately, using creativity as a formula for motivation can be almost as simple as using money. There are

many straightforward ways to encourage people to be creative on the job and achieve a motivated organization. Top Japanese organizations manage their world-class employee suggestions systems to induce creative behavior and to drive creative output including cost savings and new products and procedures. The primary objective of these suggestion systems is not to improve economic outcomes directly but to motivate people and increase their commitment (Basadur 1992).

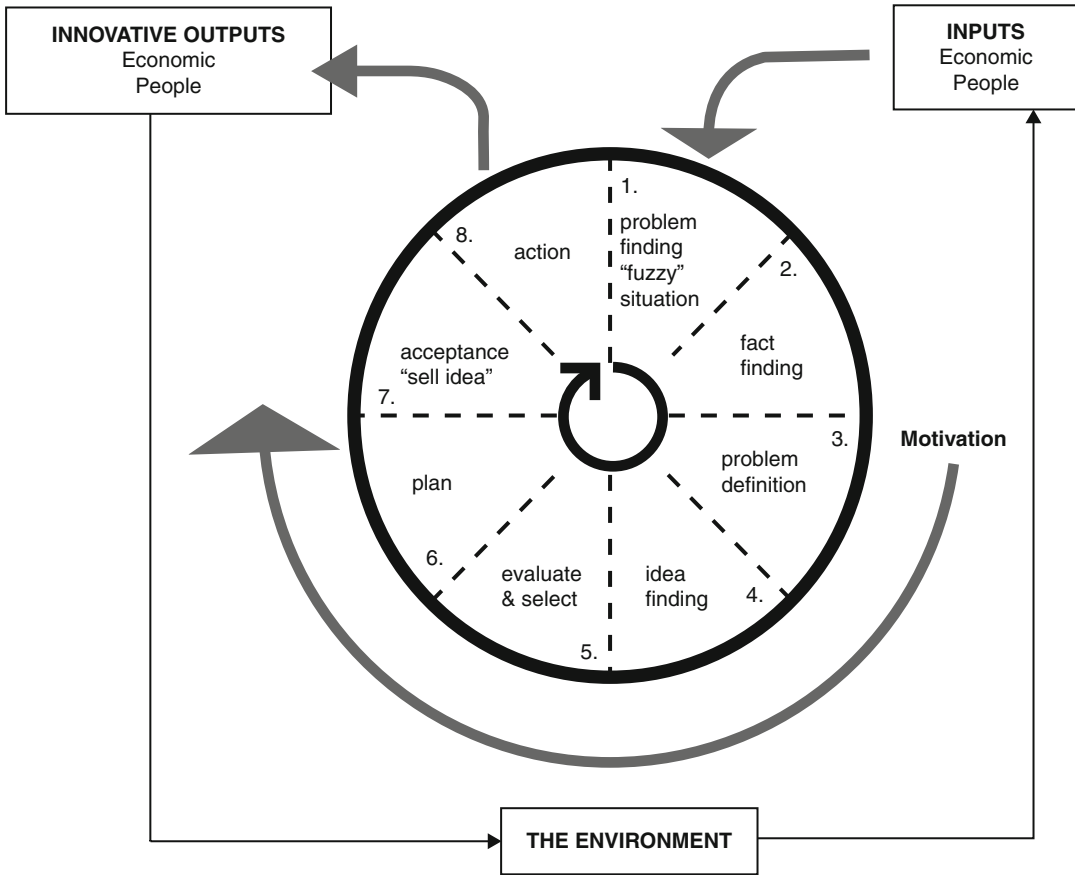
Creativity for Job Enrichment

Proactive creative activity, or adaptability, leads to a continuous flow of new methods and new products. However, acceptance of change by employees is assured because they are taking ownership of finding and solving their own problems, and implementing changes themselves. In effect, they are redesigning their own jobs, which is consistent with a well-documented axiom of social psychology: people do not resist change; they do resist being changed (Coch and French 1948). Employees enrich their own jobs by being creative.

Simplicity Thinking as the Transformational Engine

Simplicity Thinking accelerates the identification and solution of problems and opportunities across an organization. These problems and opportunities may originate in either the external or internal environments of the organization, and as they are moved through fact finding, problem definition, and then solution optimization and implementation, the organization is transformed into a state of adaptability.

Figure 8 illustrates how Simplicity Thinking works to operationalize adaptability. As problems and opportunities for change are "inhaled" into Step 1 and then "spun around" the eight step circular process ("the wheel"), the resulting implemented change (Step 8) is projected out as innovative output to be mixed in with the



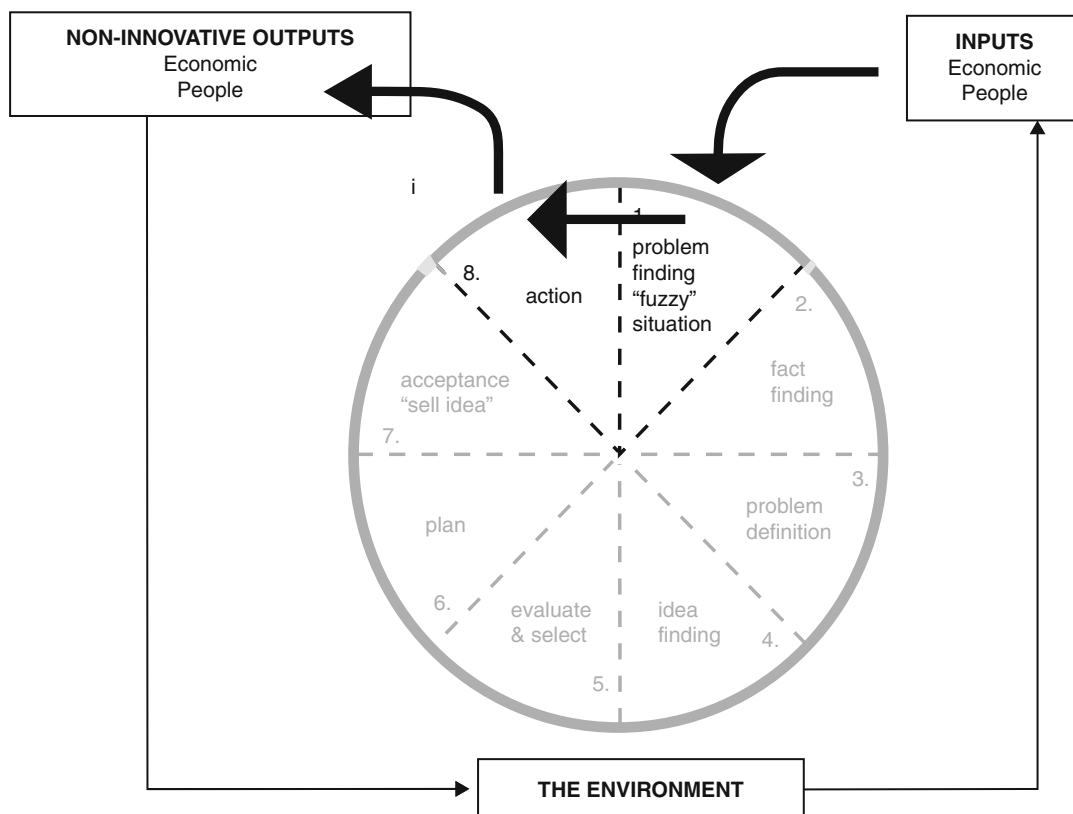
Simplexity Thinking, Fig. 8 An organization skilled at using Simplexity Thinking to operationalize adaptability and achieve innovative outputs

environment and cycled back through Step 1. This creative activity not only results in a continuous supply of new and improved products and methods, it also leads to intrinsically motivated, committed, and job-satisfied people. The motivation induced is the power that drives “spins” the wheel from Step 1 to Step 8.

In contrast, Fig. 9 models an organization unskilled in Simplexity Thinking. Unable to think problems through creatively, they instead move them directly in from Step 1 to Step 8. Without the help of the creative process, the outputs are not innovative and the people are not motivated.

Although adaptability skills are essential, it would be naïve to believe that all that is needed is to train employees at all levels in the Simplexity Thinking process and the skills to

make it work. This would only be one third of the battle. In order to make adaptability performance a normal way of life, an organization must integrate creativity thinking skills and process with a clear-cut business need and infrastructure to encourage employees to experience success applying the skills and process. Creativity skills and process must be accompanied by communication and acceptance of a well understood and motivating organizational business need for adaptability. People need to understand why they suddenly need to use their creativity on the job. The business need must be translated into a specific goal(s) to pursue. Measurable adaptability goals must be placed into the corporate strategy alongside efficiency goals. As well, a complementing infrastructure must be created which makes it easy and encourages people to



Simplicity Thinking, Fig. 9 An organization not skilled at using Simplexity Thinking moves directly to action without benefit of creative process, and achieves non-innovative outputs

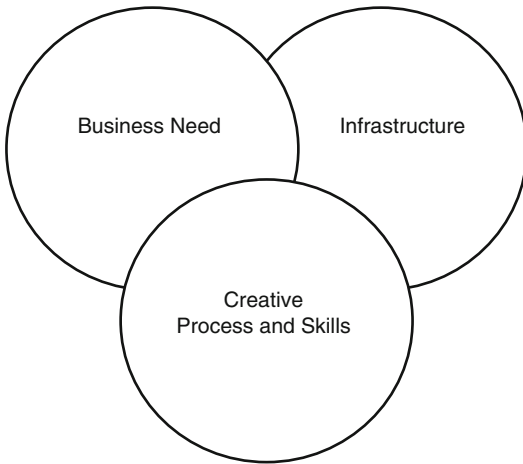
routinely use their skills to pursue the goals. An ideal scenario, for example, might see employees receive creativity training based on application of training to specific company real world problems rather than non-work-related “practice” or theoretical problems. Thus, progress is made against the goals during the training itself. Of course the infrastructure must extend beyond the training. [Figure 10](#) illustrates how these three components support each other.

Many worthwhile interventions have floundered because the organization lacked at least one of these three components: business need, infrastructure, and change-making process and skills (Basadur and Robinson 1993). If senior leaders wish to introduce an intervention, they must spell out what specific business need they intend to address (such as lower costs, higher sales, fewer defects or customer complaints, better teamwork, shorter turnaround times or faster

time to market, better products or services) to ensure that employees buy in to the intervention and can measure success. The organization must also ensure an effective infrastructure, such as performance appraisal systems or membership on interdepartmental teams, is in place so new philosophies and tools are applied regularly. Along with clear business needs, and infrastructures for implanting new initiatives, organizations must also avoid underestimating the effort required to establish people’s change-making skills, attitudes, and behaviors, and must provide adequate training.

Conclusion and Future Directions

Simplexity Thinking offers a new approach to organizational adaptability in which deep skill in executing creativity as a standard everyday



Simplexity Thinking, Fig. 10 The three necessary components of a successful effort to institutionalize adaptability

process is the key, equally important to traditional deep skill in executing traditional efficiency processes. Most of today’s executives lack this creative skill and many have turned out to be inadequate leaders, especially in recent times of accelerating change and ambiguity. However, many organizations are not as effective as others because they value short-term results above all, and reward successful implementers of routines disproportionately. Simply put, organizations favor efficiency at the expense of adaptability.

Many companies still regard innovation as an irritant, something that gets in the way of the “real work.” They are content to turn out standard quantities of standard products and achieve the sales, cost, and profit goals for this month, this quarter, this year. Their response to greater competition is to cut staff, reduce costs, lower service levels and, in some cases, lower quality. Too few respond creatively. Sometimes this is because they simply do not know how to go about it. It may be that various concepts of creativity and innovation are demystified through integration into a single simplified approach focused specifically on improving organizational performance short and long term.

Perhaps, more managers would be willing to give this simplified approach a try, especially if

they could be shown how it helps them achieve even short-term results more efficiently. Perhaps, future research could focus on strategies for helping managers grasp and increase comfort with the innovation process, skills, techniques, and style described.

Simplexity Thinking is a deliberate and continuous change-making system of attitudes, behaviors, and cognitive skills driving a process of problem generation, conceptualization, problem solving, and solution implementation, which is virtually synonymous with adaptability. It requires attitudinal, behavioral, and cognitive skills in deliberate change making and incorporates interventions into the process as tools. Under the new approach, organizations can learn to mainstream adaptability by doing two things: encouraging employees to master new skills which increase their creativity, motivation, and engagement; and creating an infrastructure that ensures that these skills will be used regularly.

More research is needed to reassure innovating organizations that they are on the right track, particularly when the results of emphasizing adaptability may take considerably longer to appear than the results of an emphasis on efficiency. A clue may be found in Japan: whereas much North American decision making is driven by the next quarter’s results, Japanese organizations favor long-term planning and reporting (Dertouzos et al. 1989). Well thought out strategies that enable organizations to confidently shift the balance between adaptability and efficiency will help them prosper over the long term and prevent their being surprised and damaged by a volatile environment.

An additional avenue for further research is to identify factors which enable an organization to effectively alter its “appropriate” balance of adaptability and efficiency rather than being caught unaware by upcoming environmental changes. What are the signals that prompt senior management to request more creativity, that motivate middle managers to act upon a top management requirement for more creativity, and that encourage individuals in the organization to act more creatively (assuming in each case that they

know how to do so)? A clue may be found in several North American corporations that had the appropriate balance for an earlier era but had to drastically change that balance during the 1980s in order to react to changes in their environment or circumstances. While suffering through 13 consecutive quarters of huge losses in the early 1980s, Ford made massive top-down training interventions to become a less authoritarian, more innovative, and more efficient organization with higher employee involvement. In order to respond to new competition, Xerox reinvented itself from a copier company into a document company and instituted a continuous process to fundamentally change how its employees work and manage. More recently, IBM reorganized itself after seeing its stock price plummet when smaller competitors capitalized on the market shift to personal computers from mainframes. An excellent research question would be how these organizations might have recognized the need to shift their balance much sooner than they did.

Implications for Leadership

Today's leaders must understand creativity as an ongoing continuous change-making organizational process, not just a sometime occurrence, or a program of discrete interventions and philosophical values of "what's good" for organizations. Effective leadership is really implanting and sustaining a system of organizational creativity that can be learned and mainstreamed to provide continuous and deliberate adaptability. Leaders must learn and adopt the corresponding new skills and new ways of thinking and behaving. To provide effective leadership in the twenty-first century, managers must become effective change agents in their everyday work (rather than to leave this as a "sometime thing" to others). In future, managers, who may have been accustomed to a command and control style which includes creating strategy and policy by themselves and then passing it down to a waiting organization, will need to learn skills in engaging their subordinates in cocreating strategy.

By engaging a wider range of people in the process of developing new strategies, ownership and successful implementation of the new strategy is more likely to occur (Coch and French 1948). Porras and Robertson (1992) describe the characteristics of an effective change agent as (1) interpersonal competence (relational skills, ability to support, nurture, and influence others), (2) theory-related problem solving and change skill (the ability to conceptualize and diagnose, to present options to others), (3) skill as an educator (able to create learning experiences), and (4) self-awareness (ability to have a clear understanding of one's own needs and motivations). These are all different from purely analytical thinking and problem-solving characteristics. To supplement these analytical skills, today's managers must learn to think and behave in new ways and to lead others to think and behave in new ways. Mintzberg (1973) documented that most managers operate primarily as short-term implementation doers. Other research (Basadur and Basadur 2010) supports this finding, suggesting many managers are especially under-skilled in problem finding and problem definition, which represent the essence of strategic thinking and adaptability. Thus, the training of managers to improve conceptual thinking skills to combine with optimizing and implementation thinking must become an important intervention to improve fundamental leadership skill.

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Simulacrum

- ▶ [Interaction, Simulation, and Invention](#)

Situated Creativity

- ▶ [Entrepreneurship in Creative Economy](#)

Six Sigma

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Synonyms

[Black belts](#); [Green belts](#); [Process excellence](#)

Introduction

“Globalisation and instant access to information, products and services continue to change the way our customers conduct business.

Today’s competitive environment leaves no room for error. We must delight our customers and relentlessly look for new ways to exceed their expectations. This is why Six Sigma Quality has become a part of our culture.” General Electric, /1/

What Is Six Sigma?

Six Sigma is a highly disciplined approach that helps all kinds of companies focus on developing and delivering near-perfect products and services.

Where does the name come from? The word “Sigma” is a statistical term that measures how far a given process deviates from perfection. The central idea behind Six Sigma is that if you can measure how many “defects” you have in a process, you can systematically figure out how to eliminate them and get as close to “zero defects” as possible. To achieve Six Sigma Quality, a process must produce no more than 3.4 defects per million opportunities. An “opportunity” is defined as a chance for nonconformance, or not meeting the required specifications. This means a Six Sigma process is nearly flawless in delivering what customers expect.



General Electric's Evolution to Six Sigma /1/

The objective of Six Sigma is usually manifold (Table 1). More and more companies use the improvement approach to not only getting better in their processes but also to unleash the potential in their employees. Giving the responsibility for their own process to employees and motivating them to find a way to deliver better quality drives continuous improvement efforts in many organizations. One key success factor therefore is “involvement.”

Successful Six Sigma project leaders, Black Belts or Green Belts, are obviously able to lead a team and a project, collect and analyze data, see through the implementation and deliver results. Hence, they show leadership qualities and should sooner or later be considered for this kind of

Six Sigma, Table 1 Objectives of Six Sigma

Status before Six Sigma	Status after implementation of Six Sigma
1. Spotty use of quality improvement approaches and tools	1. Disciplined and consistent use of proven quality tools at all levels
2. Frequent “ship-and-fix” attitude	2. Do it right the first time, based on customers’ requirements
3. Ignore costs of poor quality	3. Calculate and communicate costs to all employees
4. Function-focused values, mindset, and practices	4. Process-focused values, mindset, and practices
5. Frequent guesswork in making decisions	5. Measure and analyze objective data to help make decisions

position. Six Sigma becomes the entry point and the first step of a leadership development programme, i.e., it forms the leadership selection grid and builds basic leadership skills in a way that benefits the organization immediately.

Where Did It Come From?

Although, General Electric has made Six Sigma as famous it is now, the real inventor of the concept was Motorola. Motorola – under economic pressure in their TV business in the 1980s – were looking for ways to improve the quality of their products.

In 1986, Bill Smith, a senior engineer and scientist within Motorola’s Communications Division, introduced the concept of Six Sigma in response to increasing complaints from the field sales force about warranty claims. Six Sigma was a new method for looking at defects. Smith developed the original concepts that formed the beginning of Motorola’s Six Sigma initiative. He took his ideas to his CEO Bob Galvin, who recognized the approach as key to addressing their quality problems. Six Sigma became central to Motorola’s strategy of delivering products that were fit for use by customers.

Following a common Six Sigma methodology through the phases Measure, Analyze, Improve, and Control, Motorola began its journey of

aligning processes to critical customer requirements and installing measurement and analysis systems to continuously improve processes.

Elements of Six Sigma

In the Six Sigma philosophy, there are three key elements of quality: customer, process, and employee.

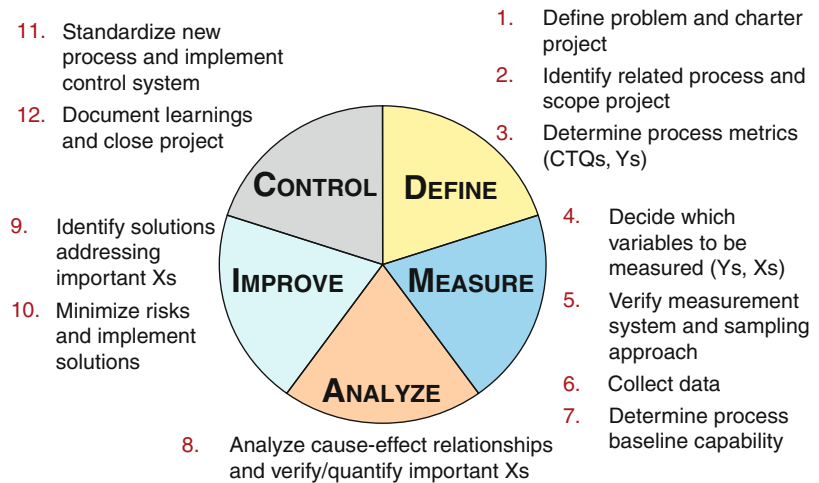
Customers are at the center of each organization because they define what quality means. They expect performance on time, long-term reliability, competitive prices, and much more. Today, many organizations deliver similar products or services for a comparable price. Therefore, just delivering what the customer expects is not enough. In order to not only survive but win in the current environment organizations need to delight their customers.

The first step to get there is to understand the customer perspective completely. Taking this perspective and looking at the *processes* of an organization is a major leap. This enables to understand the customer’s point of view not only on the quality of the product or service but also on the whole lifecycle of the transaction related to products or services. With this knowledge, new areas for improvement or even for creating more value for the customer can be identified and worked upon. *People* make things happen. All employees must have knowledge, skills, and motivation to design, improve, and run processes successfully.

Key players in Six Sigma world are

- Champions, who are leaders. They steer a Six Sigma initiative, select projects to work on and staff involved.
- Black Belts, who are the project leaders for Six Sigma projects. They are responsible for application of tools and for leading a Six Sigma team.
- Green Belts, who are on the development path for a Black Belt. They often lead smaller projects or participate in Black Belt projects.
- Master Black Belts, who are well experienced in Six Sigma and serve as coaches for above mentioned players. They are often part of the senior management team.

Six Sigma, Fig. 1 Five phases of a Six Sigma project



All of them receive extensive training in Six Sigma tools for process improvement as well as in soft skills like team leadership, coaching, influencing, and presentation skills reaching from about 2 days for Champions to more than 4 weeks for Master Black Belts. Only after passing an exam and delivering project results, they are allowed to carry the respective title.

Since Quality is the responsibility of everyone in an organization, the implementation of Six Sigma requires everyone to undergo basic training of up to 1 day per year.

Five Steps to Improvement

Typical Six Sigma projects undergo an improvement cycle of five steps (Fig. 1): Define, Measure, Analyze, Improve, and Control. Whereas Motorola started with Measure, other companies have added the phase Define after recognizing that especially improvement projects in service environments need a proper definition of the process to be improved as well as the metrics applied to measure the improvement.

Define is “Organizing Success.” In this phase, the problem gets defined and linked to critical business issues. Related process is determined and the scope laid out. The probably most

important step in Define for many organizations is a thorough and comprehensive collection and analysis of the Voice of the Customer and consequently the definition of a defect from customer’s perspective. Last but not least, a measurable goal for the project is being set.

Measure is “Collecting Information.” Hence it is about Data Collection. In this phase, potential drivers for the problem are identified and their importance for the problem estimated. Based on this information, a data collection plan is established that describes the conditions for data collection after evaluating whether the data gathering process delivers repeatable and reproducible data. After the data collection, baseline performance data are calculated and targets are defined. A major strength of the Six Sigma approach is the wide range of tools for any kind of situation. This becomes obvious in the different kind of graphs available for plotting the collected data at the end of this phase.

Analyze is “Identifying the Vital Few.” With powerful process and data analysis tools the relationship between problem and potential root causes is identified. If there is a relationship, i.e., if the factor, the potential root cause changes and at the same time the problem happens, a vital few root cause for the problem is recognized. More than 20 tools form the two data analysis

approaches: graphical analysis and statistical analysis. With the latter one the Vital Few can be verified. This is an essential prerequisite for the next phase.

Improve is “Designing and Implementing Solutions.” This phase often needs extensive creativity techniques in order to develop out-of-the-box solution ideas for the root causes identified in the previous phases. During *Improve* these ideas get transformed into solutions. Advantages and disadvantages of different solutions are considered. Risk assessment and implementation planning build further cornerstones of this phase. Often change management interventions are needed at this stage of the improvement project.

Control is “Sustaining the Gains.” It is important for any organization to make the improvements lasting and the investments paying back over time. Therefore, this phase deals with building process control mechanisms as well as monitoring systems to keep the process under observation until the improved process has “burnt in.” Additionally, a continuous improvement system similar to PDCA will be discussed to keep the process up to speed under changing conditions and increased customer requirements.

The goal of Six Sigma is to establish certain habits by going through these five rigorous phases. These habits benefit the culture of any organization and are the basis for the cultural change shown in [Table 1](#). The timeframe for such a Six Sigma project usually lasts from 3 to 6 months.

Application and Benefits

During the last 20 years, companies like General Electric or Motorola have moved from counting defects in their product manufacturing to managing variation and systematically improving all their processes. Most important, they have moved from Six Sigma as a tool for improving product quality to Six Sigma as an overall business improvement methodology. The new Six Sigma combines the power of good business

application of statistics with the critical elements of effective business strategy. It uses an overall business improvement framework to expand the organization’s ability to realize its strategic objectives.

The results are impressive: “GE’s success with Six Sigma has exceeded our most optimistic predictions. Across the company, GE associates embrace Six Sigma’s customer-focused, data-driven philosophy and apply it to everything we do. We are building on these successes by sharing best practices across all of our businesses, putting the full power of GE behind our quest for better, faster customer solutions.” /1/

Now, Six Sigma applications are showcased in all kind of industries all over the world. Apart from manufacturing it has become the way for managing and improving the business for financial services companies like banks and insurances, for Healthcare institutions, and even for governments, who are aiming to streamline their processes.

Although, the principles of Six Sigma are applicable in all kind of industry, there are some differences that need to be paid attention to in order to make it successful in service environments:

- Processes are not clearly defined like in a manufacturing environment. It means the early stages of the improvement cycle need more attention since the “identification” and definition of processes, customer needs, and defects are critical.
- Processes are driven by human beings with all their shortcomings. Hence, the soft-factor needs much more attention than in manufacturing companies.
- Measurements are more often manual rather than automated. Data collection is more complicated, focuses on discrete data and needs manual intervention. Therefore, to achieve high-quality data, more effort is needed.
- All these factors result in a constant need to motivate and attain people buy-in throughout the whole initiative.
- Rewards and recognition as well as success stories are critical to on-going success, not only but especially in Service environments.

Outlook

Over the last decades, Six Sigma went through a couple of cycles to adjust to evolving needs and to accommodate all the learning experience made by thousands of people using it every day in a lot of companies worldwide. After gaining confidence in the approach and after forming an impressive success in many organizations, it has been moved from production processes to transactional processes in manufacturing companies, later it has been applied in service companies and even in nonprofit organizations. By adding design, creativity, and innovation tools to the “standard” toolbox, a new methodology, called Design for Six Sigma, has been developed and used in all kind of design processes.

General Electric brought it to the customer in different aspects and call it ACFC – “At-the-customer-for-the-customer.” Johnson & Johnson developed an approach to bring it to their sales force in order to increase incremental revenue. They call it “Sales Force Effectiveness.” Pfizer is heavily focusing on customer satisfaction by zero-defect products and call it “Right the First Time.” Other companies bring the variation reducing power of Six Sigma into the supply chain and apply it as a combined toolset called “Lean Six Sigma.”

All this leads to the conclusion that there is no end of Six Sigma in sight. The name may change, the toolset may be enriched, the methodology may be adjusted but the goal remains the same: Quality products and services for customers through constantly improving and profitable processes driven by knowledgeable and motivated people.

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Small and Medium Enterprises

► [SME Growth and Influence of Internal and External Environmental Factors](#)

Small Businesses - Value, Transmission, and Recovery

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Synonyms

[Distressed finance](#); [Entrepreneurship](#); [Family business](#); [Ownership succession](#); [Planning](#); [Valuation](#)

Key Concepts and Definition of Terms

Small- and Medium-Sized Enterprises: Size Specificity

Size specificity for small- and medium-sized enterprises (SMEs) comes all naturally since it is etymologically rooted in its name. It delimitates a homogeneous business sector, relative to its constituent’s size. In 1996, the European Commission defined SMEs mainly via the quantitative thresholds of staff headcount, annual turnover, and annual balance sheet. This approach was enlarged in 1996, stating that a small- and medium-sized enterprise (SME), given its size, may be “any entity engaged in an economic activity, irrespective of its legal form.” Thus, the self-employed, family firms, partnerships, and associations regularly engaged in an economic activity may be considered as enterprises, irrelevant of the legal form under which the enterprise is acting. In addition, the new definition takes into account the various types of relationships between enterprises, introducing an additional criteria based on the relationship that an enterprise might have with another. Such affiliation concept distinguishes

between autonomous, partner, and linked enterprises, where an autonomous enterprise means that it is not a partner or linked to another enterprise.

In the United States, the Small Business Administration (SBA) issued a definition based on the North American Industry Classification System (NAICS), according to which three generic qualitative rules and one quantitative requirement linked to the industry type are used to identify small business entities.

Managerial Specificity

Parallel to such formal developments, researches in the small business field were forging on conceptual developments, granting the SME managerial specificities, such as the dominant preponderance of the owner-manager, the adoption of intuitive and emotional strategies and tactics, or its geographical and financial limits. Their purpose was to answer the question if an SME might be a miniature large firm and if no, to give rise to a specific nature of small business management.

Such theses became established as the dominant doctrine and have become increasingly general (Bygrave 1989; Stevenson and Jarillo 1990; Gartner et al. 1992; Filion 1997), ignoring the fact that in reality, SMEs may considerably contrast one from the other (Dandridge 1979; Welsh and White 1981; Hertz 1982; Curran and Blackburn 1993, 2001) and that the sector is hardly homogeneous.

Such heterogeneity among SMEs was mostly pinpointed on differences in ownership structures, ranging from ownership in the hand of a single person who created or bought the business to more complex ownership structures represented by cofounders, purchaser(s), family members, and heirs. In latter cases, enterprises are commonly described as family businesses, whereas such definition mainly based on ownership structure challenges the quantitative criteria of the size of the enterprises.

Derived from the heterogeneous ownership structures, SMEs often differ through the preeminent role of the owner(s)/manager(s) acting either as a person or a small group of persons,

the founder(s), or the founder's family. Such specificity usually is considered as positive in the sense of clear management identification, especially compared to the large company where ownership and, to a lesser extent, management might be more diffuse.

SME Values

Albeit values are far from being the exclusive attribute of SMEs, it is commonly accepted that SMEs have particular values, which basically derive from their specific ownership structures. Their list may be long, especially if one considers particular examples. Nonetheless, it is commonly accepted that core values such as courage, self-sacrifice, short decision-making process, moderation, sense of vision, self-responsibility, and passion depict SMEs. More, pragmatism, problem-solving focus, and adaptability stand for the manifestation of SME entrepreneurship. Curiosity, interest in innovation, creativity, specialization, and risk eagerness are usually the cutting edges, which empower the SME to stand up against its larger competitors. The symptomatic visionary approach of the archetypal paramount SME entrepreneur, the multigenerational concern of family-owned enterprises, the local engagement and rooting of many of them, and, finally, their endeavors to build and preserve a responsible reputation are considered among the drivers for the SME's concern for economically, ecologically, and socially responsible behavior.

Such values typically circulate among the enterprise thanks to informal understandings and shared expectations between the entrepreneur and the workforce. Values and ethical principles are consequently implicit rather than formally expressed through ethics policies, codes, and programs that are familiar in large companies. If SME entrepreneurs often resist standards and formal codes, large family businesses often face family conflicts, which call for a more formalized attitude regarding the issuing and the perpetuation of values. Latter are set in a "family codex" and aspire to preserve the family values, attitudes, and responsibilities toward business, stakeholders, heritage, and family-business assets.

As helpful all these values may be, they also bear drawbacks regarding the risk of competence limitation, vision myopia, financial constraints, and adverse consequences deriving from conflicts among the owners (family or not). Furthermore, the owner's desire for personal independence may have the effect of inhibiting cooperation with other firms, profitable use of external support and appropriate delegation of responsibilities to subordinates. The smallest firms often show to be generally growth averse and resistant to training, staff development, and other support initiatives.

Business Values and Valuation

SME Valuation

Under the assumption of purely financial objectives, the value of a business is based on the present value of net cash flows from the business to the owner. Such calculations of the business value can be based on capitalized earnings methodology or discounted cash flow techniques and demonstrate that the value of the business is based solely on its ability to earn business profits for the owner. As this definition of the value of a business does not depend on the size of the business to be valued, the general principles for valuation of SMEs do not differ from those for the valuation of larger enterprises.

Nevertheless, in valuing SMEs, specific matters may arise, not from the techniques as such but from possible deficiencies in the owner's management. Apart exceptions, it is a regrettable fact that SME owners often insufficiently cultivate the financial functions and structuring further than classical functions such as processing of payables, customer invoicing, payroll administration, financial reporting, etc. They hardly push the financial management systematically toward value-based management like performance measurement, risk management, forecasting, strategic planning, investment analysis, competitive intelligence, or financial restructuring by means of spin-offs, stock buy backs, slashing payrolls, selling off underperforming assets, etc.

Since these management actions stand for genuine firm's financial value boosters, the omission for not or hardly implementing them is liable to hinder the maximization of the SME's value.

Distinctive features may also adversely influence SMEs valuations, i.e., specific risks connected to the owner's management structure (dependence on a single or small group of persons, family issues, vision myopia, management and/or financial resources scarcity, etc.), the reliability of sources of information, the cut-off between business and private assets, etc.

But SMEs may also outrank bigger firms in growth. Such rapidly growing businesses excel by product and output innovation, high expenditures on human and physical capital, considerable upfront investments in development, production and sales, growing capital requirements and the use of risk capital, rapid changes in its organization, and related rapidly increasing revenues. For these entities, which appear considerably exposed to significant uncertainties and fluctuations connected with a high sensitivity of the forecast parameters, past results may indeed be inappropriate for the projection of future developments.

Hence, additional analysis is required notably in the fields of the products competitive abilities, the availability of resources in particular in finance and management skills, and finally in the fields of the keenness for implementing structural and organizational changes consequently to the rapid growth.

The result of these assessments might negatively influence valuation by means of risk premium and growth rates modulations.

On the opposite, many SMEs do not follow profit maximization objectives or are facing a downturn and may thus find themselves with poor earnings and return on equity lower than the discount rate.

If endured over a longer period of time, this can lead to the failure to pay creditors and to a state of overindebtedness, possibly leading ultimately to insolvency. In such scenario, alternative valuations should be applied,

particularly the breakup concept under which the firm is not any more considered to continue functioning as a business entity (loss of going concern status), and is split up with all assets and liabilities listed at net realization values.

Start-up Companies Valuation

Recent well-known cases occurred where start-up companies were valued at prices, which utterly disproved the classic valuation methods. Such skyrocketing start-up's share price is not a question of coincidental windfall but results from propensities a start-up shows up in the fields of market power, based on the potential to cast a remarkable footprint in an often new and expanding market; the mastery of a sustainable and sufficiently differentiated product/service; appropriate management skills; and openness and flexibility for entering into a satisfactory deal with potential investors.

If part or all of such prerequisites are met, the real business value for a big competitor originates from the chance to either eliminate an annoying challenger or catch up a missed market trend.

Likewise, venture capital investors' interest in such business comes from their strategy to join such a start-up in an early stage, lead up value enhancing stepping-stones in terms of financial and management structuring and finally negotiate an exit deal, awarded with substantial capital gains.

SME Recovery

In the United States, seven out of ten new employer firms last at least 2 years, and about half survive 5 years. More specifically, according to the U.S. Dept. of Commerce, Bureau of the Census, Business Dynamics Statistics data, 69% of new employer establishments born to new firms in 2000 survived at least 2 years, and 51% survived 5 or more years.

Recovering and regaining the former condition after a business misfortune is the hope of

each manager-owner of a SME, although the better alternative is the avoidance and prevention of the hardship. This leads to the question if SMEs are more doomed to failure than larger entities.

There are key factors that – if not prevented – will certainly weigh down a business and possibly lead to its downfall.

The most obvious failure factor is the belonging to the wrong business. Michael E. Porter of Harvard Business School in 1979 formed a framework for business strategy development analysis enabling to derive the so-called five forces which depict the competitive intensity and henceforth the attractiveness of a particular market: threat of new entrants, threat of substitute products, bargaining power of customers, and bargaining power of suppliers. The more a firm is adversely exposed to these Five Forces, the more it is considered operating in an unattractive market.

The second key factor is poor management. Sometimes small business owners lack appropriate business and management expertise external to their specific knowledge related to their business idea.

Another key factor is the insufficient capital. In the United States, the share of small business using commercial banks declined in the past, while the share using finance companies increased. But such external funds cannot substitute for the critical need for internal funds on which SMEs depend overproportionally more than publicly traded firms. Paradoxically, fast-growing companies, whose needs for financial resources are higher, appear the more threatened by financial shortages, and many confront bankruptcy in spite of encouraging growth rates.

In case financial distress happens nevertheless and the entrepreneur has the resources to counteract, specific recovery management will include operational and financial restructuring, crisis and stakeholder management, corporate liability negotiating, and, if possible and/or appropriate, implementation of exit strategy via sale or M&A.

Transmission

Definition

Transmission is understood in the meaning of ownership succession, which embraces sale and inheritance processes.

Issues in Succession

Reasons of Successions

Inevitable changes in SMEs ownership take place for a variety of reasons, some planned and others not, like the sudden death of an owner. The reasons for particular ownership changes can indeed relate to aging and lifestyle issues, changes in owners' personal circumstances, and the managerial demands of the ownership role or the dynamics of particular ownership situations. Common specific reasons for ownership change include retirement, owner needs to realize capital from their businesses, a poor trading outlook, or, conversely, the business's development potential.

Importance

Worldwide a substantial number of family businesses are facing succession, considering that an estimated 65–80 % of all firms worldwide are family-owned businesses (Neubauer 2003).

Succession Issues

Ownership succession is a complex field because of the numerous elements influencing the transaction: the seller's status, motivation and management capabilities, the buyer's status, the target's structure and transferability, and the target's business condition. In addition, a special emphasis lies on the successful transfer of the old owner's knowledge since latter often represents the key element of the SME's human capital.

Resistance often comes from owner-managers of SMEs who do not acknowledge succession as an issue and simply ignore the yet critical succession planning. The way in which management is regularly rotating especially in larger organizations is indeed mostly inexperienced in SMEs and family businesses where it is not uncommon that owner-managers live a lifelong career.

Although if this might positively influence management continuity, the excessive stretching of such status quo harms, nevertheless, definitely the management renewing process and enhances the firm's transmission pressures.

In family business, the most delicate transition commonly occurs between the founder and the second-generation founder's heir. While there is agreement in the family business literature that succession planning is highly relevant for long-term firm performance, there is no agreement regarding the best kind of succession in terms of the decision if a family member or an outsider is best to take over the firm.

Researches (Fox et al. 1996) view ownership succession in family businesses in terms of a next-generation family member taking over the chief executive officer (CEO) role. They contrast the ownership change process in a publicly owned company with that in a family business. In a public company, CEO changes take place regularly and are usually planned well in advance. By contrast in a family business, succession is an infrequently occurring process linked to generations and life spans. The number of possible successors is often limited and may be contentious. Successful change, Fox et al. (1996) argue, depends upon the effective management of the succession process.

Conclusion and Future Directions

Value, transmission, and recovery are inextricably linked by the predominance of value creation, which triggers profitability, thereby facilitating the transmission process and rendering recovery superfluous.

Cross-References

- ▶ [Business Emergence](#)
- ▶ [Business Model](#)
- ▶ [Corporate Entrepreneurship](#)
- ▶ [Creative Personality](#)
- ▶ [Entrepreneur](#)
- ▶ [Entrepreneurial Capability and Leadership](#)

- ▶ Entrepreneurship and Business Growth
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- ▶ Psychological Aspects of Entrepreneurial Dynamics
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- ▶ Schumpeterian Entrepreneur
- ▶ Small Business
- ▶ Small Businesses and Sustainable Development
- ▶ Social Responsibility
- ▶ Spin-off

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Small Business

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Synonyms

Individual enterprise; Medium-size business; Microenterprise; Small enterprise

Small is Beautiful

A small business is usually defined by its size, its independence from a large firm, and its organizational form, which is based on the key role of the entrepreneur. There is no single definition of small business: legal definitions vary by country and industry when it comes to the question of the size; there is a consensus about its qualitative properties, but this subject is extremely complex.

Employment and contribution to job creation explain why SMEs have received close attention for many years and in many countries. The economic and social contribution of SMEs is also based on their impact on territorial development, their presence in niche markets and proximity markets, and their high degree of flexibility. This flexibility is particularly useful when markets and productive systems are changing at a rapid pace. The SMEs sector is very heterogeneous but small businesses have some common characteristics: centralized management, informal information systems, low-task decomposition, short-term and implicit strategy, and close relationship with customers. The entrepreneur seizes opportunities, assumes risks, coordinates limited resources, and manages a firm. He contributes to value and job creation. Due to their economic and social impact, small business and entrepreneur are a topic of interest for nations. Since the creation of the Small Business Act in the USA in 1953, many countries have set up SMEs policies to encourage entrepreneurship and small firms’ growth. In 1979, David

Birch's study about the job-generation process in the USA was a key step both for public policies and academic research.

The small firm is not only a topic of interest for public policies. Scholars have explored this subject since the eighteenth century. Their interest has grown during the twentieth century (Landström 2005), and in one way, we can consider that the small business has become a crucial matter after large firms have grown. Research associates small business and entrepreneurship, and this field of research has gradually changed, being a topic within economic science, behavioral science, and management science.

The small business is an organizational model with an important place inside the business sector. As an agent of change, adjustment variable, or active part of a network, its specificities are of great interest for business strategy.

Small Business and Employment

Most of the time, a small business is defined by size criteria. Small- and medium-sized enterprises (SMEs) are defined officially by the EU as those with fewer than 250 employees and which are independent from larger companies. Furthermore, their annual turnover may not exceed €50 million or their annual balance sheet exceed €43 million. This definition is critical in establishing which companies may benefit from EU programs aimed at SMEs and from certain policies such as SME-specific competition rules. SMEs may be divided into three categories according to their size: microenterprises have fewer than 10 employees, small enterprises have between 10 and 49 employees, and medium-sized enterprises have between 50 and 249 employees.

Among size criteria, the number of employees is the most common due to its simplicity and accessibility. With this perspective, SMEs are considered in almost every country as firms with fewer than 250 employees, except in the United States where the threshold is 500 people and 300 in Japan. The US Small Business Administration defines a size standard eligibility depending on

the industry and based on the average number of employees for the preceding 12 months or on sales volume averaged over a 3-year period.

Behind the figures is a very heterogeneous enterprise base, in which we can find a Californian high-tech start-up, a Canadian "gazelle," an Italian small firm producing ceramic within a local and traditional network, a Japanese automotive supplier, and a microenterprise created in India using microcredit facility. This diversity can be explained by many factors: business sector, level of innovation, market size, entrepreneur's qualification and skills, etc.

In 1971, the Bolton Report defined a small business using two major characteristics: independence from a large firm and the entrepreneur is the owner and the manager. The US Small Business Administration defines a small business concern as one that is independently owned and operated, is organized for profit, and is not dominant in its field. Julien (1998) considers that small business specificity is based on five features: centralized management, informal information systems both internal and external, low task decomposition, short-term and implicit strategy, and close relationship with customers.

From an employment perspective, SMEs are key actors in most countries. Some 20.9 million SMEs represent the overwhelming majority (99.8%) of enterprises active within the EU-27's nonfinancial business economy. They account for two out of every three jobs (66.7%) and for 58.6% of value added. Small businesses also make a very large contribution to job creation. SMEs and microenterprises are also the core of informal economy. This increases their relative weight in developing countries. In Europe, for instance, 92% of enterprises are microenterprises; their relative share of the nonfinancial business economy is 29% for workforce and 22% for value added.

It is not only their contribution to employment but also their contribution to job creation which explain why SMEs have received close attention for many years and in many countries. Job creation occurs when a new firm is created or when an existing firm is able to grow and develop its staff. That is why SMEs are a crucial issue in

entrepreneurship, both for new firm creation and growth potential of young existing small firms.

David Birch focused on job creation in the USA in two major studies published in 1979 and 1987. He highlighted the role played by independent small firms in job creation by demonstrating that the younger and the smaller is a company, the higher is its job-generating power. He considers that small businesses are the “engine of the economy” because they create more jobs than giant companies, grow more rapidly, run greater risks of failure, and show more adaptability. In the most recent period, figures published by the Small Business Administration underlines that between 2000 and 2008, small firms (employing less than 500 employees) have created more than nine million jobs, while large firms (more than 500 employees) destroyed more than two million of jobs in the whole USA. These figures are the summary of four different phenomena: jobs created by firm births, jobs created by existing firm expansions, jobs destroyed by firm deaths, and jobs destroyed by existing firm contractions. David Birch has pointed out that the aggregate growth is built on massive continual failures.

SMEs economic and social contribution is also based on their impact on local development, their presence in niche markets and proximity markets, and their high degree of flexibility. This flexibility is particularly useful when markets and productive systems are changing at a rapid pace.

Small is beautiful as far as employment and flexibility are concerned, but due to their small size, they suffer from a number of handicaps that can slow their development and even lead to business failure. Their access to bank loan is difficult and access to investors and financial market even more; they often have little financial resources and are undercapitalized; they suffer from financial weakness that causes lack of investment, less effort in research and development, and limited commercial effort; they have difficulties in gaining access to international markets and public or complex markets; and they suffer from weak negotiating in relation to their large customers and suppliers, leading to low

margins, constraints on just in time delivery, and long delays in receiving payments, despite recent European legislation. They are often poorly diversified and exposed to business risks. They can have difficulty in recruitment of qualified employees.

Since the creation of the Small Business Act in the USA in 1953, many countries have set up SMEs policies. The main kinds of measures on which these policies are based are easing the tax burden; developing public funding for research, job creation, investment, and exportation in order to facilitate risk-taking; accompanying small firms who intend to extend their markets, developing access to venture and development capital funds, facilitating access to public procurement contracts; promoting entrepreneurship by making an effort in entrepreneurial training in schools and in the university system.

Beyond this, most nations have set up a variety of public funding and support services to encourage new firm creation. These measures are very wide in order to cover a large spectrum of creations, from a local traditional microfirm to a technological knowledge intensive start-up. For the latter, a good example is the French 1999 law on innovation which combines different measures: definition of conditions for enabling researchers to set up companies to apply the results of their research, creation of seed capital funds with a mix of public and private capital, and creation of incubators for innovative businesses, national competition for innovative company creation, and research tax credit.

An Entrepreneurial Organizational Model

The small firm is not only a topic of interest for countries and public policies. It is also an organizational model with an important place inside the business sector. Small is beautiful . . .but sometimes big is plentiful; for many years, large firms have been considered as the only kind of firm able to perform financially due to economies of scale and range economies. In this perspective, small firms are suboptimal, particularly in industry.

But in some activities and some conditions, there can be scale diseconomy. Big size emphasizes organizational problems and creates rigidity and bureaucracy.

Mintzberg (1989) describes the main characteristics of entrepreneurial organization: its structure is simple, its organization resists any form of organization, communication is informal, and decision-making depends on the entrepreneur. Definition of strategy is based on intuition of the leader who reacts quickly.

Further, the transaction cost theory points out that a firm's creation is based on a choice between market and hierarchy, between organizational costs and transaction costs. In order to avoid both transaction costs and internal organization costs, some firms use hybrid organizational modes consisting of partnership, vertical partnership and company network.

Frey (1996) has focused on firms' boundary and defined the transactional firm. The transactional firm (or network firm) can come from a large firm disintegration, a network of small companies operating in the same district, or a central firm dealing with peripheral entities. The network firm is a hybrid organizational model, which is based on cooperation and coordination that neither market nor hierarchy can provide. This kind of network firm is neither a centralized large firm nor a completely autonomous small firm. Porous borders between small and specialized units characterize it.

Due to their size, SMEs are active in proximity and niche markets and often choose a strategy of focusing. They occupy specific places in markets and value chains and insure a complementarity with large firms. Audretsch considers they are agents of change because of their flexibility and reactivity. They are able to seize opportunities neglected by large firms and play a key role in knowledge circulation. For instance, small biotechnology firms are very innovative and often develop partnerships with "Big Pharma." In this case, they share financing, risks, and intellectual property. Small companies focus on research and development when large companies deal with large-scale production and marketing. Entrepreneurs in

biotechnology always come from private or public research. They play a key role in innovation as mediators between science and market.

In some cases, large firms try to develop their entrepreneurial ability by using corporate venturing: intrapreneurship, spin-off, capital-venture, joint venture. Corporate venturing is a good way to set up entrepreneurial organization inside or close to the large firm. It enables large firms to explore external opportunities or develop new ventures that are risky or noncored businesses. In short, it is a good way for a large firm to act as a little one.

Conclusion and Future Directions

Entrepreneurial ability of small business is of great interest for nations because of its social and economic impacts. It is also an important matter for existing large firms looking for growth and innovation opportunities. The evidence suggests "small is beautiful."

But the small business is not a unique organization model. Job and value creation can be seen as an aggregated phenomenon, while it is based on a turbulent and chaotic collection of companies that are constantly changing, going from success to failure. David Birch considers that a pulsation model characterizes small firms. Part of the small firm sector is extremely volatile and unstable.

Many issues are still unresolved and represent a challenge both for scholars and public policies. Two of them can be underlined and concern the smaller and the bigger of what is commonly called "small business." The first question is about how to encourage firms' creation, especially when entrepreneurial intention is low. This question deals with education and entrepreneurial culture. It is a very important question in schools and universities that have to play a key role to encourage entrepreneurship as a way to professional insertion. The second question is about the mid-sized companies that are far too rare in some countries, whereas a majority of young firms never create jobs. Encouraging

growth of microenterprises and reinforcing skills of individual entrepreneurs are two major challenges for many countries.

Cross-References

- ▶ [Business Climate and Entrepreneurship](#)
- ▶ [Business Emergence](#)
- ▶ [Business Start-Up: From Emergence to Development](#)
- ▶ [Entrepreneur](#)
- ▶ [Entrepreneurial Opportunities](#)
- ▶ [Entrepreneurship](#)
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- ▶ [Innovation and Entrepreneurship](#)
- ▶ [Microfirms](#)
- ▶ [Venture Capital and Small Business](#)

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Small Business Firms

- ▶ [Microfirms](#)

Small Business Operation

- ▶ [Start-Up and Small Business Life](#)

Small Businesses and Sustainable Development

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Synonyms

CSR; Environmental management; SME

Introduction

If, in light of their numbers, small businesses currently seem less sensitive to the stakes of sustainable development than large firms, they could nevertheless play an important role in expanding the practices. More and more tools, specific devices, and policies are becoming available to them. Their behavior differs somewhat from that of large firms, and at present, there is not a common theoretical approach concerning the commitment of small business in sustainable development.

Corporate Social Responsibility, the “Contribution of Business to Sustainable Development”

Sustainable Development

The story of the concept of sustainable development is now rather well known. Many authors suggest that it began with the Meadows report for the Club of Rome's book “Limits to Growth,” published in 1972, which put forward the idea that natural resources are not inexhaustible and illustrated the interdependence between the economic and ecological dimensions of development in a systemic approach. That same year, the first

United Nations Conference on the Human Environment was held in Stockholm. It was the first United Nations international conference displaying environmental concerns. At the time, the expression “sustainable development” was defined as “development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” in the Brundtland Report (1987), written under the aegis of the World Commission on Environment and Development and adopting a political and economic outlook while also introducing the social dimension. Later, numerous developments were presented during the United Nations Conference on Environment and Development, also called the Rio Conference or Earth Summit, organized in 1992. A document was produced called the Rio Declaration on Environment and Development, consisting of 27 principles intended to guide future sustainable development. Another outcome was an action plan referred to as Agenda 21, an agenda for the twenty-first century. Two other conferences were held under the aegis of United Nations: the Johannesburg World Summit on Sustainable Development in 2002 and the Climate Change Conference held in Copenhagen in 2009. A new conference, known as Rio + 20, is scheduled to be held in Rio in 2012. Through this short history, it is clear that the concept of sustainable development is closely associated with the United Nations from both a political and economic standpoint and that the environmental dimension is of the utmost importance.

In the Firms: CSR

Corporate social responsibility, or CSR, is an older concept than sustainable development. According to Aggeri et al. (2005), the concept of CSR emerged at the same time as large firms at the end of the nineteenth century and continued to develop throughout the 1920s, focusing on the question of the relations between firms and society. The debate was formalized by H. Bowen in an academic book entitled *Social Responsibilities of the Businessman* (1953). He presented social responsibility as a voluntary initiative on the part of businessmen and founded on ethical considerations. In the 1960s, the “business and society”

outlook developed, sometimes taking account of the environmental dimension and involving numerous debates. Then in the 1970s, firms made CSR a more operational consideration through social audits and social reporting with a view to providing answers to social and stakeholders’ demands. The notion of stakeholder has continued to develop since the end of the 1970s, especially with the publication of E. Freeman’s book entitled *Strategic Management, A Stakeholder Approach* (1984). Aggeri et al. (2005) note that the “business society” approach does not refer to sustainable development. Consultants and international organizations made the link between the two concepts.

CSR, “A Business Contribution to Sustainable Development”

According to Aggeri et al. (2005), the main figure in uniting the theoretical concepts developed in the field of CSR and the notion of sustainable development is a British consultant, John Elkington (Commission of the European Communities 2002). Through his office, Sustainability, founded in 1987, he developed the strategic council to the companies in the field of sustainable development. He also coined the term “triple bottom line” (TBL), based on the three acknowledged pillars of economic, social, and environmental considerations (people, planet, profit). The World Business Council for Sustainable Development – an association of companies – was founded in 1995, while in 2001, the Commission of the European Communities published a green paper on CSR entitled *Promoting a European framework for Corporate Social Responsibility* paying particular attention to the relations between CSR and sustainable development. However, it was in a communication published in 2002 that CSR was most clearly presented as “a business contribution to sustainable development.” CSR was defined as a “concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis” (Commission of the European Communities 2002, p. 5). The document stresses the need for businesses to

integrate CSR as a strategic point in corporate management. The environment is one of the dimensions of CSR. In the recently launched international standard ISO 26000, the fruit of negotiations between six categories of stakeholders from 93 countries and 42 international organizations, the environment is one of the seven “core subjects” included in the standard. It should be noted that sustainability deals generally with the environmental dimension. It is the view used in this entry.

SMEs

Small and medium enterprises are now considered to be important players in the economic game. This was not always the case. While the earliest firms to be established were small, larger firms became the norm in the wake of the industrial revolution. However, since 1975 and the oil crisis, the limits of large firms have been revealed, and small businesses once again began to attract more attention, as they generally represent more than 90% of all firms. Nowadays, many public policies are dedicated to small firms, be it at international, national, or regional level. The European definition of an SME is first based on staff, but other criteria are also taken into account. According to the European Commission, an SME is first and foremost “any entity engaged in an economic activity, irrespective of its legal form.” An SME employs fewer than 250 people and has either an annual turnover not exceeding 50 million euros or an annual balance sheet total not exceeding 43 million euros. Three categories can be distinguished: microenterprises (fewer than 10 employees with neither the annual turnover nor annual balance sheet total exceeding 2 million euros); small enterprises (fewer than 50 employees with neither the annual turnover nor annual balance sheet total exceeding 10 million euros); and finally medium-sized enterprises (fewer than 250 employees with an annual turnover of less than 50 million euros or an annual balance sheet total not exceeding 43 million euros). SMEs benefit from numerous policies designed to support their development by creating a favorable business environment either at national or international level. In the field of

sustainable development, many recommendations have been put forward. For instance, the European Expert Group on Corporate Social Responsibility and Small and Medium-sized Enterprises conducted work aimed at helping “small businesses to integrate social and environmental issues into what they do.” There are also publications about SMEs and the environment. Along with other international institutions, the OECD (Organization for Economic Co-operation and Development) promotes policies favorable to SMEs on the one hand and policies in support of sustainable development on the other, although the latter are primarily intended for large companies. UNIDO (United Nations Industrial Development Organization) has also developed a program called REAP (Responsible Entrepreneurs Achievement Program) for small firms, based on the triple bottom line.

SMEs and Environmental Management

Environmental Management

Environment management is one dimension of CSR. It is difficult to find a precise definition. ISO 14000 is the standard used for environmental concerns. The first version was drafted in 1996, at about the same time as the EMAS. Today, ISO 14001:2004 and 14004:2004 are in use. According to ISO 14000, environmental management means:

- Identifying the environmental impact of the activities of the organization and what to do to minimize the harmful effects of these activities on the environment
- Establishing how to constantly improve its environmental performance

It can also lead to the implementation of a systematic approach with environmental objectives, targets, and indicators to demonstrate that the objectives have been reached.

The EMAS (European Eco-Management and Audit Scheme) is a voluntary environmental management tool available since 1995. Its aim is to implement “continual improvements in the environmental performance of companies and others organizations” by means of “tools

allowing organizations to measure, evaluate, report and improve environmental performance.” Initially restricted to industrial companies, it was opened to all economic sectors in 2001 and revised in 2009. Environmental management is defined as “the management of a company’s activities that have an impact on the environment,” but SMEs do not make great use of these systems. Recently, ISO has produced both a handbook and a CD specially designed for SMEs to make it easier for them to implement environmental management systems in accordance with ISO 14001. A new standard, ISO 14005:2010, has also been developed for them, while EMAS has developed a toolkit for small organizations. According to ADEME, the French Environment and Energy Management Agency, there are two aspects to environmental management: an “organizational approach” developed at production sites and subject to EMAS or ISO 14001 and a “product approach” aimed at designing or improving products with a view to minimizing their environmental impact throughout their life cycle. In the case of SMEs, it would therefore appear that there is no precise definition of environmental management, but just a collection of actions aimed at minimizing the environmental impact of the products and their production or of all the organizations’ activities. These actions can be designed as part of a systemic approach.

SMEs’ Behavior

Most of the literature in the field of environmental management and SMEs claims that small enterprises do not adopt the same behavior as larger firms. Generally, there is a discrepancy between the attitude of SMEs toward the environment and their behavior. Most of the owner-managers have a positive attitude toward sustainable development or environment, but there is a discrepancy between this attitude and the practices observed. Many SMEs are not aware of the negative externalities they may produce. A recent study published under the auspices of the European Commission measured the environmental impact of European SMEs (Constantinos et al. 2010). According to the

authors, it was the first such detailed study in Europe. The study estimates that SMEs account for approximately 64% of industrial pollution in Europe. Differences can be observed between sectors, but the results must be qualified by taking the number of small firms in the different sectors into account. There is a positive relation between the size of the firm and the actions implemented to reduce their environmental impact. This result is consistent with that of several other studies. A very small proportion of SMEs uses environmental management systems such as EMAS, ISO 14 001, or national systems (about 0.4% in the European study). However, in the “Ile-de-France” region in France, an investigation has shown that, of all the different dimensions of CSR, it is the environmental aspect which has given rise to the most actions.

Many studies have tried to identify the reasons for this behavior and the rationales that might push them in this direction.

Barriers to the Integration of Environmental Actions in SMEs

Several publications mention first the owner-managers’ lack of awareness of their environmental impact. Even if they are aware of this impact, they either perceive it as being too small for measures to be required or they feel that it is not their responsibility.

Other barriers are mentioned. The typical characteristics of SMEs are generally mentioned, including a lack of financial and human resources, time, skills, expertise, or “ecoliteracy” concerning environmental matters. This is why they do not correctly perceive the potential advantages of environmental management. Reducing their environmental impact is seen as a cost burden which cannot be transferred to customers rather than as a potential competitive advantage similar to cost reduction or reputation enhancement. Furthermore, product or process differentiation founded on environmental best practices could easily be copied by competitors and cannot, therefore, be defended in the long term. Familiarity with environmental legislation may also be weak, as it is considered too complex or costly to implement.

Many authors also cite external barriers such as the lack of public infrastructure in terms of transport or collection systems and waste treatment, the lack of financial support, and inadequate institutional structure and business support services in the environmental sector. The lack of adequate tools is also a factor, as those available are generally designed for larger firms, while the role of external pressures can also be cited. Many studies mention the lack of demand from stakeholders, customers, or the supply chain. This will be discussed later. Finally, the lack of information on environmental matters also contributes to explaining the discrepancy between SME attitudes and behavior in the field of environmental management, as SMEs do not adopt proactive behavior by actively seeking information. It should nevertheless be noted that this behavior is changing as a result of awareness campaigns.

More generally, it should be noted that all these barriers gradually decrease as environmental issues become “institutionalized,” which means that the more practices develop, the more they tend to become established as implicit standards. Owner-managers are now less likely to underplay their environmental impact and now demonstrate much more positive attitudes toward implementing environmental actions. They are also more positive about the relative costs and benefits of these environmental actions and are able to see potential business opportunities arising from their implementation, even if they are not convinced that environmental measures could actually increase profits. Nevertheless, size is an important contingency factor. Among SMEs, larger firms are more committed to environmental actions because they are better able to identify the benefits of these actions.

Drivers of the Implementation of Environmental Management Actions

Many factors also are considered to be drivers of SME commitment to environmental actions. Compliance with regulations is an important driver, both directly and indirectly, by increasing the awareness of the environmental impact of SMEs. According to managers, facing the same

environmental constraints is also a means of ensuring equality between firms.

The entrepreneur/owner’s personal interest in sustainable development is also an important driver of the SMEs’ commitment to environmental actions, as the manager plays a dominant role within his firm. Many studies suggest that altruism, or moral imperatives, are among the most important drivers of environmental action, even if SMEs, especially the smallest ones, do not see any significant economic benefits. SMEs perceive the benefits of their environmental commitment in terms of an improvement in product/process quality, an increased market share, or the opportunity to enter new markets, but the smallest SMEs do not benefit from these advantages except for a small number enjoying cost reductions.

The role of stakeholders is not yet clear, as mentioned previously. Some recent surveys have shown that the main benefits to SMEs of addressing environmental issues are a reduced risk of prosecution, improved customer relations, and greater customer appeal. Pressure from customers, suppliers, or other stakeholders does not, however, seem to be significant. The improvement observed in employees motivation and performance has been mentioned recently as the major reason for SMEs to invest in environmental measures. Other works mention the influence of supply chains, especially in highly concentrated industries, where larger firms tend to transmit the pressure exerted on them by their stakeholders to SMEs through the value chain.

Theoretical Approaches

Most works in the field of small businesses and sustainable development are devoted to the environmental practices, the drivers of and barriers to the commitment of small firms to these actions, and contingency factors. For the most part, however, the theoretical basis is neither clear nor explicit. In some cases, stakeholder theory is mentioned but generally to state that it is not relevant. To ensure a better understanding of the theoretical frameworks that can be used, it is necessary to explain those used for CSR.

According to Gendron (2000), CSR is generally analyzed using three approaches:

- The business ethics approach, which focuses on the moral and ethical dimension of business activity. In this approach, CSR is seen as the application of morality in business and focuses on values and normative judgments.
- The business and society approach, a school of thought which is concerned with the relationship between society and business through social contracts. The firm has to prove the legitimacy of its activity to society; otherwise, society could react and compromise its future.
- The social issue management approach is referred to as being utilitarian or strategic. It holds that social issues have to be treated as parameters that must be taken into consideration in the strategic management of the firm.

Capron and Quairel-Lanoizelée (2007) position the different approaches to CSR on a continuum between two extremes:

- On the one hand, neoclassical theories, illustrated by Milton Friedman, claim that a company has no other social responsibility than to generate profits for its shareholders. According to this school of thought, it is the main condition underpinning an optimally functioning economy. The incorporation of societal goals by a firm hinges on its financial performance. In this context, agency theory attempts to define the relationship between shareholders and managers and how they influence each other in aligning their interests. In the case of small businesses, this theory does not apply because the manager is generally also the owner. Stakeholder theory is something of an extension of agency theory. It takes account of all stakeholders, i.e., all the categories of actors who have a direct or indirect interest in the activities of the firm, not only the shareholders and the managers. However, these relations can be seen from two points of view. In a view similar to that of neoclassical theory, taking the expectations and requirements of stakeholders into account is considered a prerequisite for the

profitability of the company because its future depends on these stakeholders who contribute to developing its competitive advantage. According to Capron and Quairel-Lanoizelée (2007), this approach supports most CSR instruments and frames of reference. The other point of view is closer to the other extreme.

- The other extreme – the business ethics approach – considers that companies have a moral duty to operate in a socially responsible way, especially toward their stakeholders. This approach is diametrically opposite to the neoclassical vision, where morality is observed outside the firm and is established by the market or governments (Gendron 2000). In the field of business ethics, the firm has a moral obligation toward its stakeholders resulting from its moral necessity to contribute to the general welfare of society.
- Between these two opposing schools of thought lies the third vision – the business and society approach – founded on the notion of a contract between society and business, which are seen as interrelated entities. This approach is generally based on neo-institutional sociological theories (Di Maggio and Powell 1983). Firms cannot operate independent of the context in which they exist. They must ensure their legitimacy by sending positive signals showing compliance with the values of society.

In the field of environmental management, the different frameworks are mobilized, often not explicitly. Several contributions deal with competitive advantages garnered by environmental commitment. The role of the stakeholders is also discussed in many papers, sometimes from a moral standpoint and sometimes from a profit-seeking perspective, or even simply with regard to the relationship between the firm and other actors in society.

Other approaches are also adopted, including the entrepreneurship theory, founded on the characteristics of the entrepreneur, or the theory of social capital, which is similar to the business and society approach. From a psychological standpoint, the theory of planned action

(Fishbein and Ajzen 1975) attempts to explain the transition from a positive attitude toward a behavior to the intention of implementing this behavior. Finally, some approaches may deal with innovation.

Conclusion and Future Directions

Environmental management is the environmental dimension of CSR, the application of the concept of sustainable development to business. While the practices are now well developed in large firms, at least according to what they say, a discrepancy can still be observed in small firms between the attitudes of the owners/managers and their behavior. Many studies have been devoted to analyzing these practices as well as the incentives and barriers to implementing environmental practices in small firms. Nevertheless, there are still many areas to be explored. First, there is still no consistent theoretical framework for this analysis, as stakeholder theory does not appear to be suitable. Two lines of investigation could be developed: neo-institutional sociological theories and innovation theories. In particular, very few process-oriented approaches have been put forward, except for the commitment stage. Another aspect of this process needs to be explored: the use of adequate tools to help SMEs to implement actions in the field of sustainable development.

Cross-References

- ▶ [Entrepreneur](#)
- ▶ [Green Business and Entrepreneurship](#)
- ▶ [Small Business](#)
- ▶ [Social Responsibility](#)

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SME Growth and Influence of Internal and External Environmental Factors

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Synonyms

Business environment; Enterprise life cycle; Small and medium enterprises

Introduction

Enterprise growth has been an area of study for many researchers. The study of literature on small and medium enterprises (SMEs) suggests that all SMEs go through different stages of growth also commonly called as life cycles. Though the terms used by different authors may vary, the events through which each enterprise passes remain more or less the same. Most of the researchers suggest that each enterprise has to start, then grow while facing various challenges and crises, and finally mature and decline. There are many factors which will contribute to an enterprise's success. There are many precursors also, which will allow an enterprise to move from one stage to another. History of the enterprise, entrepreneur's characteristics, different agencies like market and government, and geography are some of the factors influencing enterprise's growth. There are two sets of thoughts prevailing among researchers; some suggest that the growth path followed by the enterprise is linear or predictable, and others suggest that the growth is fairly opportunistic term or unpredictable. Growth-oriented firms are a significant contributor in nation's economic gain, but the concept of growth is different for different entrepreneurs. Growth can be defined in terms of revenue

generation, value addition, and expansion in terms of volume of the business. It can also be measured in the form of qualitative features like market position, quality of product, and goodwill within the customers. While studying the growth of a firm, it is essential to understand the concept of "the firm" also. The understanding of the growth of an enterprise depends on the definition of what the firm is, how much it has grown, what it offers to the market, what assets it controls, and what its legal form is.

It is critical to study how an enterprise manages its growth transitions and what pattern they follow. Most widely used framework for studying growth of an enterprise has been the life cycle analysis. In life cycle models, an enterprise's growth is considered as organic, and these are assumed to grow over a period of time in a linear phase. However, there are many researches suggesting that it may not be the case with every enterprise. Many firms do not take the linear path because it is not possible for each of those to progress through each stage. They can grow, stagnate, and decline in any order and also these things can happen more than once and there is a possibility to reverse their steps.

Enterprise growth can be identified in four theoretical perspectives: the resource-based perspective, the motivation perspective, the strategic adaptation perspective, and the configuration perspective. Resource-based perspective focuses on its resources like expansion of business activities, financial resources, and educated staff. Resource-based theory holds that there are unlimited source of opportunities in the marketplace. It is essential to manage transition (i.e., the point at which the resources are being reconfigured) by deploying firms' resources for identifying and exploiting the next growth opportunity. Hence, to determine successive phases of growth and development, resources need to be reconfigured during the transitions between stages. To conclude there are limited studies on the growth path of SMEs. During the literature review, it has been observed that study on enterprise growth has still not covered many prominent sectors like handicraft and handloom, which constitutes large number of SMEs. This entry encompasses literature review

on various theories of enterprise growth. It highlights that though there are many studies on the stages of enterprise development, there is a dearth of literature to find patterns of growth followed by the small and medium enterprises. Also there is lack of literature on effect of environmental factors in determining growth path. This entry suggests a need for a framework which can be empirically tested by researchers to study enterprise growth patterns under different conditions. This entry is organized as follows. Section “[Entrepreneurship and Enterprise Growth](#)” presents the state of work done in the area of small and medium enterprises, entrepreneurship, and enterprise growth based on the literature reviewed for this study. Section “[Theoretical Frame Work to Study the Growth Path of Enterprises](#)” introduces the conceptual framework. Next, section “[Research Gaps](#)”, outlines the gaps identified in research so far.

Literature Review

Entrepreneurship and Enterprise Growth

Entrepreneurship is all about identification of an opportunity, creation of new organization, and pursuing new ventures (Carton et al. 1998). There are many studies done on entrepreneurship like external skills required in entrepreneurs, e.g., Schumpeter (1934) has stated that entrepreneurs need to be innovative, creative, and should be able to take risk. Wickham (2006) has also supported his views. Pajarinen et al. (2006) have said that entrepreneurs with higher academic background are more innovative and they will use modern techniques and models to do business. Barringer and Bluedorn (1999) have described entrepreneurs as individuals who can explore the environment, discover the opportunities, and exploit them after proper evaluation. Kuratko (2009), in his book, distinguishes between entrepreneurs and small-business owners. He highlights that these two terms are often used interchangeably, but both have a lot of differences in their reaction under certain situations. An entrepreneur aggressively focuses on innovation profit and growth of the enterprise.

On the other hand, a small-business owner’s objective and focus is mostly on managing stable growth, sales, and profits.

An entrepreneurial venture is successful if it is growing. Growth has various connotations. It can be defined in terms of revenue generation, value addition, and expansion in terms of volume of the business. It can also be measured in the form of qualitative features like market position, quality of product, and goodwill with in the customers (Kruger 2004).

As stated earlier, growth is a vital indicator of a flourishing enterprise. There are many factors like characteristics of the entrepreneur, access to resources like finance, and manpower which affect the growth of the enterprise and differentiate it from a nongrowing enterprise. Gilbert et al. (2006) suggested how and where questions are important in the context of the growth of the enterprise. It has been highlighted that growth is a function of the decisions an entrepreneur makes, like how to grow internally or externally and where to grow in domestic market or international market. There are many different theories to identify the main factors underlying the growth of the enterprise. One set of theories addressed the influence of enterprise size and age on growth (Evans 1987; Heshmati 2001; Morone and Testa 2008), and the second set deals with the influence of variables such as strategy, organization, and the characteristics of the enterprise’s owners (Fazzari et al. 1988; Lumpkin and Dess 1996; Freel and Robson 2004) on growth of the enterprise. Mateev and Anastasov (2010) have found that enterprise’s growth is related to size as well as other specific characteristics like financial structure and productivity. They further added that the total assets which are one of the measures of the enterprise size have a direct impact on the sales revenue, but the number of employees, investment in R&D, and other intangible assets has not much influence on the enterprises growth prospects. Lorunka et al. (2011) have found that the gender of the founder, the amount of capital required at the time of starting the business, and growth strategy of the enterprise are very important factors in predicting growth in a small enterprise.

They have further highlighted that apart from human capital resources, the growth of an enterprise can be predicted on the basis of commitment of the person starting a new enterprise.

SMEs, Innovation, and Economic Development

Small and medium enterprises (SMEs) are considered as the backbone of the economy. SMEs sector is well recognized worldwide due to its significant contribution in socioeconomic development. This sector has contributed significantly in higher growth of employment, output, promotion of exports, and fostering entrepreneurship. Many countries have given sufficient emphasis to micro, small, and medium enterprises and have identified them as a building block for their economic development. Market conditions have changed for SMEs after economic reforms; organizations are in constant pressure to perform well, deliver quality, and also keep their operational cost low. To sustain in today's market and meet customers' requirements, it has become important for organizations to differentiate themselves on the basis of capabilities and competencies. They need to compete on different dimensions such as design and development of products, manufacturing, cost, distribution, communication, and innovative ways of marketing. These challenges call for reorientation of SMEs so that the demand for high dynamism, flexibility, and innovativeness can be met. For economic development it is critical for SMEs to create, apply, and introduce innovation (Curran and Blackburn 1994). It has been found that in the previous century, 60 % of the innovations were in the SME sector but many of them were not successful due to lack of professionalism and inability to collaborate with other enterprises (Rothwell 1986; Noteboom 1991; e.g., Bougrain and Haudeville 2002).

There is no universal definition of SMEs. Countries have used various criteria for defining SMEs. Some countries use turnover of the company to determine the size of an enterprise, whereas some use fixed investment or the number of employees (Lokhande 2011), sales volume, and worth of assets (Raman 2001). In India, as

per the Micro, Small, and Medium Enterprises Development Act, 2006, micro, small, and medium enterprises are classified in two classes: manufacturing enterprises and service enterprises. The enterprises engaged in the manufacturing or production of goods are defined in terms of investment in plant and machinery:

- A small scale industry is defined on the basis of limit of value of investment in plant and machinery, which is more than 25,00,000 rupees and does not exceed five crore rupees.
- A medium-scale industry is defined on the basis of the value of investment in plant and machinery, which is more than five crores rupees, but does not exceed ten crore rupees.

In India the focus is more on the investment amount, whereas most of the other countries define small and medium enterprises (SMEs) in terms of number of employees and turnover. According to the SME White Book 2009–2010, "In Malaysia, small enterprises have a turnover between rupees two lakhs fifty thousand to one million and medium enterprises have a turnover between one million and twenty five million. Also, the average employee strength for SMEs is fifty employees and one hundred fifty employees respectively. In Hong Kong, the definition of SME is given by the Government of Hong Kong Special Administrative Regions (HKSAR). According to the HKSAR, a manufacturing business that employs fewer than hundred persons. . . ." Further, "In China, small enterprises are defined as those that employ fifty to hundred people and medium enterprises employ hundred one to one hundred fifty people. In the European Union (EU), a business with a headcount of fewer than two hundred fifty is classified as medium sized, a business with a headcount of fewer than fifty is classified as small. In United Kingdom (UK), a small enterprise as a unit has a turnover of £5.6 million, and employs around fifty people. A medium sized enterprise has a turnover of £22.8 million and has two hundred fifty employees. Canada defines a small business as one that has around fifty to hundred employees depending on service and manufacturing respectively. A firm that has around five hundred employees is classified as

a medium sized business. In Japan, for the manufacturing sector, SMEs are those that employ less than three hundred people or have an invested capital of less than hundred million yen. In the United States of America, an SME means a unit consisting of one thousand five hundred employees and has a turnover of around \$0.75 to 29 million, depending upon the type of business. In the US a government department called small-business administration (SBA) sets the definition of small businesses.”

Significance of Growth in SMEs

SMEs are considered as a major source of employment generation also. It has the advantage of cheap labor and flexibility of operations along with indigenizing technology (Mitra and Pingali 1999). There are a large number of studies suggesting that small businesses play a major role in job creation (Smallbone and Wyer 2000). Though there are many arguments on the overall contribution of small businesses in the new employment, it is considered as important source for employment creation (Curran 2000; Davidsson and Delmar 1997; Gibb 2000; Hamilton and Dana 2003; Robbins et al. 2000; Tonge et al. 2000; Westhead and Birley 1995). Baumol (2004) suggests that small entrepreneurial organizations and entrepreneurs will always be considered important for growth of developing economies. Hence, it is critical to pay attention on the overall growth of this sector. There are different views on the growth of SMEs. The existing body of knowledge covers different factors influencing the growth of small firms. Some of the work is being discussed in this section to highlight different views on SMEs and growth.

Chaston and Mangles (1997) suggest that if an enterprise adopts multi-strategy transformation initiatives, the probability of achieving growth objective increases. They further point that in planning a performance improvement program, different capabilities must be given priority depending upon the development stage of the firm. Kolvereid and Bullvag (1996), in their study, found that almost 40 % of the respondents do not want to grow. Further they found that there is significant relation between education,

industry, past growth turnover, past growth in employees, and entrepreneur’s aspiration to grow. Aspirations are also significantly related to many factors like experience, sex, location, and size of the firm. They concluded that entrepreneurs who want their firm to grow will have higher level of education and will tend to have manufacturing firms rather than service firms. Government has included many promotional policies for the promotion of this sector like product reservation, infrastructure support, directed and concessional credit, tax concession, special assessment in procurement of equipment, facility of duty drawback, quality control, and providing market network. Small-scale companies provide support to large-scale companies by supplying goods and services in small quantities, which in turn help them to achieve competitive advantage (Majumdar 2007). Muthiah and Venkatesh (2012) suggest that many factors contribute in the SME growth; similarly there are many barriers to growth. For small businesses, barriers can be of two types: institutional and financial. An institutional barrier includes enterprise’s interaction with government, issues related to legalization, taxation, and government support. Financial barriers will involve lack of financial resources (Davidsson 1989). Further the author notices that SMEs can also face external and internal barriers along with social barriers which would cover aspects of market position of an enterprise, access to right kind of human resources, and access to network (Bartlett and Bukvic 2001). Studies have shown that there are many other factors that contribute to failure of a small firm/business; small businesses are dependent on the owner’s insight, managerial skills, training, education, and the background of company’s leader. Often lack of these characteristics is the cause of small-business failure (Gaskill et al. 1993).

Theoretical Framework to Study the Growth Path of Enterprises

To study the growth path of the enterprises, several scholars have suggested different theoretical framework. In this section, a brief review on the framework for studying the growth path of the enterprises is provided.



SME Growth and Influence of Internal and External Environmental Factors, Fig. 1 Pictorial representation of phases and crises of growth (Masurel and Montfort 2006)



SME Growth and Influence of Internal and External Environmental Factors, Fig. 2 Pictorial representation of stages of enterprise growth (Churchill and Lewis 1983)

Penrose (1959) has suggested that enterprises are a bundle of internal and external resources, which helps an enterprise to achieve competitive advantage. She further adds that in the long run, there can be a limit to the growth of an enterprise, but not to the size. Growth of an enterprise is determined by the rate at which experienced managerial staff can plan and implement this plan. She has further explained that the external environment of an enterprise is an image in the mind of the entrepreneur. Enterprise activities are governed by their productive opportunities which are actually a dynamic interaction between the internal and the external environment. This interaction includes all the productive possibilities that the entrepreneur can see and take advantage of. The author also mentioned that growth often has a connotation of natural and normal – a process that will occur whenever conditions are favorable. Size of the enterprise is incidental to the growth process and “an enterprise is a coherent administrative unit that provides administration coordination and authoritative communication” (Penrose 1959: Xi, 20). She has proposed that the growth of the enterprise is limited by the scope of managerial resources, specially the ability to coordinate capabilities and introduce new people into the enterprise.

Greiner (1972) has done the foundational work on the theory of enterprise development. Based on his theoretical review of growing enterprises, he has concluded that enterprises move through five distinguishable stages of growth. Each phase contains a relatively calm period of

growth that ends with a management crisis (see Masurel and Montfort 2006). These five phases and crises of the growth are through creativity, direction, delegation, coordination, and collaboration (Fig. 1).

He suggests that an enterprise goes through evolution and revolution crises. These crises can be solved by introducing new structures and programs that will help employees to revitalize them. Greiner’s phenomena of evolution and revolution became the base for many studies on enterprise life cycle. Another significant contributor in this field is Adizes (1979), who argues that the attitude and style of a manager has a lot of influence on the life and effectiveness of an enterprise (see Masurel and Montfort 2006). Adizes has also pointed out that reinforcement skills, self-commitment, risk-taking capacity, vision, and administrative mastery are required in the first few stages of an enterprise development. Once an enterprise reaches its prime stage, the manager needs to be result oriented and should show proper planning and coordination skills. At the maturity stage, enterprise should be backed by systems to achieve the target.

Applying the findings of Greiner to the small entrepreneurial business situation, Churchill and Lewis (1983) have developed a model. As defined by them, an enterprise can have five stages of growth depicted below (Fig. 2).

Existence is the first of the entrepreneurial venture. In this stage the enterprise struggles to establish its processes and works without a formal structure in place. The owner of the

enterprise takes close supervision of each and every business activity.

At the second stage, which is survival, the business grows and the entrepreneur feels the need to have additional capital to expand the business. Since the business activity is growing, he/she prefers to add family members or known people as partners to expand the business. The main aim of the enterprise is to reach the break-even point, so that adequate cash flow can be maintained to meet day-to-day requirements of repair and replacements.

At the third stage of success, the enterprise begins to earn profits. They have enough capital to either invest in further business opportunity or continue with the same pace of growth. At this stage enterprise may take up team building and people development as one of their focus areas; however, these initiatives are driven by personal values and vision of the entrepreneur.

At the takeoff stage, focus is on further growth and expansion, seeking new opportunities. The organization becomes more formal in nature, and work is properly defined and delegated. Finally at the resource maturity stage, the enterprise is no more called a small enterprise. Company gives more emphasis on quality control, financial control, and creating a niche in the market.

Bridge et al. (2003) suggest that it is not necessary that an enterprise develops in discrete phases with clear boundaries between them. They further highlighted that “separating the development process into stages is rather like dividing the spectrum of visible light into colors.” The authors argue that while broad stages of development of an enterprise can be indicted, it is very difficult to say when the business moves from one stage to another. Enterprises do not necessarily follow the linear models. It is not possible for an enterprise to progress through each stage. They can grow, stagnate, and decline in any order and also these things can happen more than once and there is a possibility to reverse their steps. Authors suggest that growth of an organization is a result of many discrete efforts. As also suggested by Blundel and Hingley (2001), growth may be achieved quickly, slowly, or not at all. It depends on the strength of

the growth aspirations and growth-enabling factors of an enterprise. Hence, it is not possible to consider growth as a norm or an even progression of an enterprise.

Levie and Lichtenstein (2010) have suggested that the stage model and life cycle theories of entrepreneurial growth do not provide ample evidences of the enterprise growth and development. In their review of literature of the last 40 years, they have found that there is no agreement on defining the stages of enterprise growth. Further they have pointed out that previous researches lack proper evidences on what is the path of progress from one stage to another and the reasons behind the shift. They have suggested a new dynamic stage theory which argues that organizations are not like organisms and their growth can be co-created with the help of shifting of internal as well as external environment. Dynamic states offer that an enterprise can survive and maintain itself by being flexible and by adopting continuous changes in the environment. The author highlights the need to have a sustainable growth approach instead of growing on the basis of number of stages. Though the authors strongly recommend the use of dynamic stage theory, they conclude that an empirical research is required to find out what makes a dynamic state sustainable and when and where dynamic states change, also which contextual variables are important for the processes. Leitch et al. (2010) also suggest that there is need to understand the growth phenomenon and its importance to conceptualize the phenomenon properly. There is a lack of shared understanding on the causes, effects, and the process of growth. In the above paragraph, it was mentioned that growth is a social construct (Majumdar 2008); hence, there is lot of diversity in it. The heterogeneity of the enterprise, entrepreneur’s context, adds further challenges to the study and understanding of growth. Leitch et al. (2010) also observe that three questions related to growth have been addressed at least to some extent: why, how, and how much. They further suggest that there is still lot of scope of exploration on growth as “internal process of development” (Penrose 1959).

SME Growth and Influence of Internal and External Environmental Factors, Fig. 3 Pictorial representation of chasms of growth by Chaston 2010



Chaston (2010), in their book, has suggested that under the life cycle concept of an enterprise, a new chasm has to be crossed before the next stage of growth can be commenced. Chasms are of five types: launch capacity, expansion, organizational formalization, succession, and long-term growth (Fig. 3).

Crossing each chasm will require the entrepreneur to acquire new skills and also prioritize managerial task inside the organization. The author further suggests that some of the entrepreneurs may take more time to move from one chasm to another, while for some it may be a fast progression. Financial backing, nonviable means to new technology may be the reasons for not able to cross Chasm 1 (Dunn and Cheatham 1993). To be able to cross Chasm 2, the entrepreneur should be able to generate demand and increase sales. For crossing Chasm 3, there is a need for capacity expansion. One needs to match the demand with appropriate supply. Failure to implement a formal organization structure, with professional manpower will pose challenges to cross Chasm 4 (Anon 1984). A well-established business will require a competent successor. The entrepreneur may decide to appoint an internal person or can bring new chief executive from outside of the company. An ineffective replacement for the founder may cause the business to fail to cross Chasm 5 (Ip and Jacobs 2006)

To summarize there are two theoretical frameworks of enterprise growth.

The predictable framework defines that the growth path can be linear, sequential, deterministic, and invariant (Churchill and Lewis 1983; Greiner 1972; Adizes 1979; Kimberly 1979; Hanks et.al 1993). There are different thoughts

on defining the growth path of an enterprise in a predictable way starting from existence, survival, success, and takeoff and culminating with maturity then reinvention or death (Churchill and Lewis 1983; Casson 1982). The enterprise competitiveness continuously increases from the start-up stage to mature stage. At the decline stage, the competitiveness of the enterprise weakens and signals that in case the enterprise does not upgrade itself, it will fall. Chen et al. (2008) suggest that the enterprise at different life cycle stages should focus on strengthening capabilities.

The other school of thoughts suggests that there can be abrupt changes in the growth path especially in small enterprises. Recent researches have shown that due to unpredictable intervening factors like knowledge and technology, absorption capabilities, the appropriateness of founder's judgment, and competitive environment, the sequences of stages may be heterogeneous in small enterprises. Phelps et al. (2007), Aislabie (1992), Levie and Hay (1998), Rutherford et al. (2003), Stubbart and Smalley (1999), have argued that the life cycle models and the deterministic approach to growth are not relevant to all organizations. The authors point out that describing an enterprise growth through a series of stages is equivalent to assuming an organization growth as organism metaphor. Majumdar (2008) has suggested that enterprise growth depends upon entrepreneurial vision and standpoint. He has further suggested that entrepreneurship is not only maintaining a status quo but it is very critical that enterprise grows.

Enterprise growth depends on the vision and motivation of entrepreneur. The growth parameters vary from one entrepreneur to another.

The environment in which the enterprise is operating, such as social setting, formal and informal structure of organization, country of origin and its culture, and family, has different implications on the enterprise growth. Summaries of models have been done by Quinn and Cameron (1983), Phelps et al. (2007), and Levie and Lichtenstein (2010). This provides the evidences on the common propositions about organization growth, but there is a lack of integration among these studies and one cannot draw any conclusion out of it.

Business environment can perceive through four theoretical frameworks (see Davidsson and Wiklund 2000). When the focus of the enterprise is on its resources like expansion of business activities, financial resources, and educated staff, the growth is to be studied from the resource-based perspective. Growth studies applying strategic adaptation as a perspective would focus more on power distribution, structural complexities, and control mechanisms. The third theoretical perspective of an enterprise growth will be motivation perspective which focuses on the individual and their actions. Lastly, configuration perspective deals with the growth process focusing on managerial problems and how it can be dealt with, at various stages of growth. The scope of this study will cover the first perspective of enterprise growth, i.e., resources based.

Research Gaps

Literature review suggests that entrepreneurial growth has been an area of interest for policy makers, practitioners, and researchers. Many aspects of enterprise growth have been studied in the last 50 years, but there are very few studies conducted on the growth path followed by SMEs in different context. Majority of literature emphasizes growth of an enterprise through a predetermined path (Greiner 1972; Adizes 1979; Kimberly 1979; Churchill and Lewis 1983; Hanks et al. 1993). However, in the last couple of decades, there are some researches suggesting that sequence of stages of growth can be heterogeneous (Aislabie 1992; Levie and Hay 1998; Rutherford et al. 2003; Stubbart and

Smalley 1999; Phelps et al. 2007) due to intervening external and internal factors. The availability of literature on alternative growth path like Jumps (Aislabie 1992), skipping stages (Masurel and Montfort 2006), and other developmental paths taken by SME's are not profound.

Growth process of an enterprise may vary from country to country, though there are many studies on the stage of an enterprise growth. The study on growth pattern of an enterprise influenced by the internal and external environmental factors is limited. There is a need to develop a conceptual framework to study the growth of SMEs as influenced by the various environmental factors.

Suggested Framework

Ardishvili et al. (1998) classified empirical growth research as either factors of growth studies or growth process studies. Environmental factors effecting the growth of enterprise can broadly be classified into two categories, i.e., internal and external factors ("Business Environment," 2001). Environment is defined as an "aggregate of all conditions events and influences that surround and affect it." It can be divided into external and internal components for better understanding:

- The internal factors are those which are controllable and comprise of the enterprises personnel, its strategy, and its functional, operational, marketing, financial, and technical capabilities.
- The external factors are beyond the control of the enterprise and comprise of economic, sociocultural, regulatory and legal, political, financial, trade, technological, demographics, geophysical factors, etc.

In order to choose an appropriate unit of analysis, the factors (internal and external) connected with growth of an enterprise ("Business Environment") are briefly given below:

External Factors

All the factors that provide opportunities or threats to an organization make up the external

environment of the organization. In a broader sense, it encompasses a variety of factors discussed below.

Demographic environment includes factors like size, growth rate, age composition, and sex compositions of the population. The heterogeneity of demographics in terms of varied tastes, preferences, beliefs, temperaments, etc., affects the demand patterns of populations, and the enterprises need to make different strategies accordingly. Social environment factors include human relationships and its effects on the society and hence growth of an organization. Cultural environment and its understanding are important to understand the business environment in its totality. Understanding a particular culture and its proper analysis provides opportunities for establishing and running a business. The term political environment refers to factors related to management of public affairs and their impact on the growth of an organization. Economic environment encompasses economic planning like five-year plans, budgets, and monetary, fiscal, and industrial policies. Thus, economic system is a very important determinant of the scope of enterprises and therefore a very important external factor influencing business growth.

Business enterprises are closely associated with financial environment. To reduce the uncertainty arising out of the dynamic nature of financial environment, it is important to understand the pulse of money market and capital market. In pursuance of the broad objective, World Trade Organization (WTO) has been established and under its preview, General Agreement on Trade in Services (GATS). The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) and the Agreement on Trade-Related Investment Measures (TRIMs) have been brought. This has made trade environment one of the deciding factors affecting the future of a business. The technological environment has a huge impact on the growth of a business. It comprises factors related to applied knowledge and the materials and machines used in the production of goods and services. Enterprises are corporate entities and have to abide by the law of the land; every country has its own system of law.

Each country has its different legal systems with varied complexity and dimension. Hence, it is essential that an enterprise operating in global environment understands and copes with the global laws. The regulatory factors comprise the factors related to the planning, promotion, and regulation, by the government. Some of the factors which influence the regulatory environment include the constitutional framework, directive principles of state policy, fundamental rights, and division of legislative power between central and state governments. It also includes policies related to import/export, distribution, pricing, public sector, small-scale industries, and sick industries development. Other external factors effecting business environment would include tax environment and ethical environment.

Internal Factors

The internal environment comprises of resources, synergy, and distinctive competencies of a firm. All these together determine organizational capability in terms of its strengths and weaknesses existing in different functional areas: marketing, operations, personnel, financial, technical, etc. Business managers need to monitor the business opportunities and threats that have or likely to have an impact on their organization. However, the internal environment is constantly influenced by the external environment.

Strategy of an organization indicates the course of action to achieve the set objectives. This involves an analysis of the organizational factors (internal and external) with the environmental factors (opportunities and threats). Organization structure of an enterprise is affected by a number of factors like size of the business, the nature of the business, the diversity of the business, the characteristics of the market, the characteristics of the strategy, and the future plans of the organizations. A flexible organization structure enables the organization to quickly and effectively respond to the changes in the market. Marketing capability factors are those related to the pricing, promotion, and distribution of products or services. Operation capability factors are those that are directly related to productions. It involves factors like capacity, location, layout,

product or service design, degree of automation, and extent of vertical integration. Personnel capability is one of the most important factors influencing business environment. These factors are related to the existence and use of human resources and skills in the enterprise. It has significant bearing on the capacity and ability of an organization to implement its strategy. Personnel capability would involve factors related to acquiring, maintaining, developing, and training people. It will also take care of factors related to industrial relations and organizational and employees' characteristics such as corporate image and working conditions. Financial capability factors include all those factors which are related to the availability, usage, and management of funds. To keep pace with the changing business scenario, organizations are giving a lot of importance to its technical capabilities. It is important to improve productivity and quality in this fierce competitive era. This objective can be met through continuous improvement in the work structure, procedure, and technologies. Technical people of an enterprise may bring this competitive advantage.

Conclusion and Future Direction of Research

It is important to understand the growth path of an enterprise. Study of growth prepares the owners/manger to take strategic decisions and lay out expansion plans. The above-mentioned literature review suggests that there are many studies on identifying stage of an enterprise growth, but there is a dearth of data on how these enterprises grow and what the influencing factors are. In each geography the characteristics of enterprises differ. They are unique and operate in unique social economic conditions. There is a need to study how the internal and external environmental factor affects the growth path followed by the enterprises. Under specific conditions subset of the factors can also be taken for more intensive study. Further scope of the study could be in how growth of the SMEs can be integrated with sustainable development and innovation. There have

been recent studies on how innovation can stimulate sustainable development, but there is no significant work done covering SMEs. There should be empirical research on how internal and external factors contribute in sustainable innovativeness in SMEs. In the same regard, as pointed by Carayannis et al. (2012), innovation can be described by "quintuple helix model" which has five helixes, i.e., the education system, economic system, natural environment, and media-based and culture-based public and the political system; all these helixes have critical role to play in determining enterprise growth path as well. However, future researchers can study how these helixes individually as well as collectively can facilitate or impede growth of enterprises.

Cross-References

- ▶ [Entrepreneurship and Business Growth](#)
- ▶ [Entrepreneurship and Small Business Agility](#)
- ▶ [Entrepreneurship in Creative Economy](#)
- ▶ [Entrepreneurship in Developing Countries](#)

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Social Capital

- ▶ [Creativity: Cultural Capital in Mathematics](#)
- ▶ [Social Networks and Entrepreneurship](#)

Social Capital of the Entrepreneur

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Synonyms

[Decision](#); [Entrepreneur](#); [Rationality](#); [Social networks](#)

Introduction

The main characteristic of the concept of social capital is its wide theoretical origin. Marxist, neoclassical, and Keynesian sociologists (and economists) have all shown interest in this subject. The idea of social capital was developed at the beginning of the 1980s by the French sociologist P. Bourdieu. But, the story of this concept is longer. At the end of the 1980s, two American sociologists, R. Putman and J. Coleman, developed this concept in two different ways. For Putman, social capital is the key to democracy, a link between people and government. The analysis of Coleman is microeconomic; social capital is a resource for the individual, a resource for action. The concept of “embeddedness” of Granovetter exists in this context, to explain the social process for making decisions within an economic structure based on market mechanisms. To summarize, social capital is a (relatively) new concept to explain a commonplace sociological phenomenon.

This concept (with a wide range of definitions) has very quickly become one of the most important socioeconomic concepts. Today, for sociologists and economists, social capital has become a kind of magic formula to explain complex social phenomena. Social capital can be defined easily as a set of social networks, but many questions can be formulated. How can the process of decision-making be explained? What is the nature of social links between individuals? How can social cohesion be explained? The questions are numerous, but the concept of social capital can provide an answer to explain these phenomena, when definitions of social capital are so numerous. For example, what is a social network? Who owns social capital? What is the level of the analysis? At the individual level? Of a community? Of a country?

So economists cannot analyze the concept of social capital without studying the historical context of this arrival. The beginning of the 1980s was characterized by the neoliberal revolution. The market and the individual initiatives were considered as the engine of a new economic dynamic. The welfare state (for education, health,

social security, and so on) began to assume less importance in the lives of many people. In an economic context where unemployment is increasing very quickly, individuals look for a solution, not thanks to public aids but in their own capacity, increasing their social capital.

The objective of this entry is not to present all the theories of social capital. For the demonstration, only four authors are selected: Bourdieu, Coleman, Putman, and Granovetter. These authors are considered as the four key authors of this concept. The objective is to analyze the origins and the historical context to the genesis of the social capital concept. Subsequently, this text presents some of the usual analyses of social capital, as promulgated by these four well-known sociologists. This concept appears as an answer for understanding the process of decision-making and as social means to improve social life in a society which has to face new challenges, for example, the creation of innovative enterprises.

Social Capital, Origin and Historical Context

Origins of Social Capital

The process of decision-making in neoclassical theory is based on the concept of economic rationality. In the marginalist context of competition, individuals take decisions in an environment of uncertainty. They know prices and quantities, like the other individuals in the market. Individuals have to maximize their utility (or their profit) according to their own resources (e.g., their income). In the Walras' model, there is no uncertainty, no risk (so the entrepreneur does not exist). After the Second World War, H. Simon built the concept of limited rationality. This means that individuals take decisions in a context of uncertainty. Each individual has his (or her) information and resources, because they function in a given societal context. This aspect of the analysis was presented in the Menger's model, according to which individuals operate in a context of uncertainty.

During the 1960s, G. Beker developed the concept of human capital. But human capital

was not invented by Becker. Adam Smith in 1776 developed the first definition of human capital in his analysis of the division of labor (manufacturing of pins). He considered that the simplification of tasks can stop the increase of labor productivity. So, for Smith, there was a complex relationship between the division of labor and human capital.

Usually, human capital is a stock of competencies, knowledge, and personality embodied in the ability to perform labor so as to produce economic value. It is the sum total of the attributes gained by a worker through education and experience. It is similar to the “physical means of production,” that is, one can invest one’s human capital (education, training, medical treatment) to find a good (or a better) job. So investment in human capital (like physical capital) is a way to improve someone’s capacity for labor. So, in a general sense, capital (physical or human) can produce greater value than it costs. Capital is a means to create new values in economic theory. Human capital, as a factor of production, is substitutable. Can economists develop the same analysis for social capital? Is social capital a factor of production? And what kind of value can social capital produce? Why have sociologists built the concept of social capital? But then, on the other hand, it is necessary to underline that for Coleman, for example, there is a strong link between social and human capital. The individual builds his human capital in a defined social place (family, education, experience, and so on).

Historical Context

The development of the concept of social capital takes place in a particular historical context. This new context is characterized by the emergence of the entrepreneurial society (according to D. B. Audretsch), in which the entrepreneur takes a new role and a new place. The entrepreneur has to innovate and to create jobs. He has to take initiatives in a competitive environment contrary to the salaried society where places and economic roles are more stable.

So for this reason, the concept of social capital is important to analyze entrepreneurial behavior. And, at the end of this entry, there is

a presentation of the concept of the resource potential of the entrepreneur which is a synthesis of different elements of these four analyses. The objective is to develop a dialectical analysis between methodological individualism and the global analysis of social mechanisms.

The beginning of the 1980s was characterized by important economic and social changes in developed countries: decline of economic growth, increase of unemployment, development of entrepreneurship, and market regulations. So, the Keynesian regulation of the 1950s–1970s was replaced by liberal regulation. Governments were looking to promote entrepreneurship so as to create new jobs and technological and social innovations. The objective was to promote a new market and social regulatory system that could be measured. The World Bank program, “Doing Business,” defined 10 topics (e.g., starting a business) to comparing the business regulatory environment across economies and over time and competing toward more efficient regulation.

Bourdieu, Putman, Coleman, and Granovetter, or Four Key Definitions of Social Capital

The Concept of Capital in Social Sciences: A Resource or an Economic Organization

During the 1980s, sociologists took an interest in the economic process of decision-making and tried to improve their own understanding of social mechanisms. They built the concept of social capital to try and understand this phenomenon. But, the word “capital,” which is common in economics, is not neutral. “Capital” in economic theories has different definitions, even if, in a general sense, capital is only a factor of production. Capital is an ancient economic concept. In classical theory, capital is a factor of production, both with labor and land. In Marxist analysis, Capital (with a “capital C”) is not only a means of production; capital is also a social form of economic organization. Capital is the essence of capitalism. Capital in Marx’s theory is also “dead labor” (or “passed labor”), because

capital (as an engine or a factory and so on) is the result of the process of labor. Sociologists use the concept of capital in different ways, but whatever their definition, they analyze capital as a source of value.

Bourdieu, Social Capital, Economic Capital, Cultural Capital, and Symbolic Capital

The French sociologist P. Bourdieu built the concept of social capital to improve not the neoclassical model but the Marxist theory of social classes. The ambition of Bourdieu was to develop a new social theory to understand the social mechanism of reproduction of inequalities between individuals and classes. Bourdieu defined social capital as a network of social relations belonging to individuals. It takes its place in his analysis along with other, different kinds of capital: economic, cultural, and symbolic. The economic capital is the stock of income and patrimony of the individual. The cultural capital is composed of three kinds of resources: incorporated (by knowledge, competencies, etc.), concretized (by the ownership of items), and institutionalized (by diplomas). The symbolic capital is composed of all the kinds of capital recognized by society.

Bourdieu uses the concept of social capital like the other types of capital as a basic element of the reproduction of social inequalities. Unlike Granovetter, Bourdieu does not use the word “embodied,” but he argues that individuals have a social role which is determined by the place they occupy in society. In this way, the objective of Bourdieu is to explain the mechanisms of reproduction of social inequalities and also that inequality is not confined to economic issues but also cultural, social, and symbolic ones.

At the end of the 1980s, two American sociologists, R. Putman and J. Coleman, developed the concept of social capital in two different ways. Putman built the concept of social capital to analyze democratically imposed regulation in developed countries (especially in the United States), while Coleman developed a similar concept to analyze the process of individual decision-making. But this was not the only difference.

Putman or the Decline of Social Capital in the United States

For R. Putman, social networks existing between individuals change their behavior. The experience that an individual acquires in a community transforms his (or her) behavior. So, there is an interaction between individual and social behavior. Putman measures the decline of social capital in the United States by the decline of social, traditional, civic, and fraternal organizations which are a link between people and government. Putman distinguishes two types of social capital to understand the mechanism of social cohesion: “bonding capital” and “bridging capital.” The first one occurs when you are socializing with people who are like you (same age, race, religion, and so on). The second one occurs when you make friends with people who are not like you. He explains that the “institutional performance” is based on social capital. It operates on trust, norms of reciprocity, and networks of civic engagement. In a long article published in 1995, “Bowling Alone: America’s Declining Social Capital,” he developed the theses of the decline of social capital in the United States: between 1980 and 1993, membership of bowling clubs declined by 40 %, while the number of players increased by 10 %. The solitude of the bowling player has become a symbol of the division of American society. He observes also the decline in electoral participation, in religious practice, and in the influence of trade unions. Putman explains that this is the reason for the economic decline of the United States, because the vitality of this society was based on powerful local associations.

Coleman, Social Capital or a Social Resource for Action

The analysis of Coleman (1986) is based on relationships of confidence between individuals in small communities. He defines three kinds of social capital: “obligations and expectations,” “information channels,” and “social forms.” In the neoclassical tradition, Coleman considers that social capital has the same properties as other forms of capital: it is productive. Like physical and human capital, social capital does not consist entirely of fungibles. Unlike other forms

of capital, social capital inheres in the structure of relations between actors and among actors. “*Obligations and expectations*”: this form of social capital depends on two elements: “trustworthiness of the social environment, which means that obligations will be repaid, and the actual extent of obligations held.” “*Information channels*”: information is important in providing a basis for action. But acquisition of information is costly. Social capital provides information that facilitates action. “*Norms and effective sanctions*”: when a norm exists and is effective, it constitutes a powerful form of social capital. For example, “effective norms that inhibit crime make it possible to walk freely outside at night in a city (. . .).” In all these cases, social capital is a resource to improve individual situation.

Granovetter, Market Society Embodied in Social Links

Since the 1980s, the concept of social capital has taken a considerable importance in economic and sociological analysis. A wide range of studies have been developed at different levels, particularly to explain the entrepreneurial process. During the same period, M. Granovetter developed the concept of “embeddedness” which launched the new socioeconomic theory to explain that individuals or firms are points of embeddedness in social networks, even in an actual market economy. According to Granovetter, it is impossible to explain economic phenomena based only on economic analysis. Economic phenomena are based on social networks. The roots of his analysis are based on a far deeper philosophical study (with numerous references to Thomas Hobbes) and also to Karl Polanyi (whose famous book *The great transformation* was published in 1944) and to Oliver Williamson (with his famous book *Markets and Hierarchies*, published in 1975). Polanyi argues that the construction of a “self-regulating” market necessitates the separation of society into economic and political realms. So the development of a market society causes massive social dislocation. According to Granovetter, market regulation is based on social networks. From the analysis of Williamson, Granovetter extracts the concept of “opportunism” – “self-interest seeking

with guile; agents who are skilled at dissembling realize transactional advantages. Economic man. . . is thus a more subtle and devious creature than the usual self interest-seeking assumption reveals” (Williamson 1975, p. 255, cited by Granovetter 1985, p. 487). In this context, Williamson argues that the creation of a firm is an answer to increasing transaction costs. According to Granovetter, markets can be organized by different types of social networks existing between enterprises and managers. Granovetter underlines that economic transactions and social relationships are linked: “I argue that the anonymous market of neoclassical models is virtually nonexistent in economic life and that transactions of all kinds are rife with the social connections described” (Granovetter 1985, p. 495) (see Table 1). So, according to Granovetter, there are two types of social networks: informal and institutional. Informal networks are based on interpersonal social networks (family, friends, neighborhoods, colleagues, and so on). Institutional networks are based on impersonal social relations.

The Resource Potential of the Entrepreneur

Resource Potential, Elements for a Definition

The concept of resource potential is developed to analyze the process of social action in a particular case: entrepreneurship. This concept is useful in order to assess the role played by the social origin, the education background, the professional experience, and the financing of entrants. Each individual owns a set of resources and uses his (or her) potential to improve their economic situation (to find a job with a good salary, to create an enterprise, to find another professional activity, and so on), and their choices also depend on their own resources. The resource potential is not a natural gift, but it is the product of a social process, of the opportunities and constraints implied by this process. The resource potential can be analyzed in three respects: (1) knowledge (schooling, secondary education, higher education, further education, and professional

Social Capital of the Entrepreneur, Table 1 The four key authors and definitions of social capital

Authors	Definition of social capital	Place of social capital for understanding society
Pierre Bourdieu	A network of social relations owned by individuals Social capital takes place in the analysis of Bourdieu with different kinds of capital: economic, cultural, and symbolic capital	The Bourdieu analysis is founded on the Marxist theory of social classes
James Coleman	Social capital is a resource devoted to finding other resources for action There are three forms of social capital: obligations and expectations, information channels, and norms Social capital also forms a link between individuals	Coleman's analysis is founded on methodological individualism
Robert Putman	Social capital is the key to democracy to develop civic, social, associational, and political life There are two forms of social capital: Bonding capital: occurs when you are socializing with people who are like you (same age, race, religion, and so on) Bridging capital: occurs when you make friends with people who are not like you	The objective of Putman's analysis is to explain the social mechanism of social reproduction
Mark Granovetter	The power of the connections between actors in dense social networks The mechanism of the market is embedded in social networks (a response to Karl Polany's book, <i>The Great transformation</i> – 1944)	"Strength of weak ties" and "strength of strong ties" (1973) The concept of "embeddedness": economic relations between individuals and firms are embedded in social networks

Source: From the references

experience), (2) financial resources (personal savings, bank loans, venture capital, and different forms of public supports), (3) social relationships (family, personal, professional, institutional relations, etc.) (see Table 2). These three aspects are interdependent. For example, the knowledge of an individual depends on his education and/or professional experience. And the family context influences the educational choices positively or negatively. Many entrepreneurs were born to families of entrepreneurs. While studying, the individual meets others who can become partners and bring knowledge, money, and relationships.

Links with Bourdieu, Putman, Coleman, and Granovetter

Like Coleman, socioeconomic theories argue that social capital is a resource for action. But, like Granovetter and Bourdieu, these theories also consider that individuals are embedded in a social context, that economic activities are supported by social links. Individuals are an

element of social dynamics in an interdependent relation between individuals and society. Following Granovetter, theories argue that two types of social networks exist: one based on interpersonal links and the second based on impersonal links. Personal and interpersonal links are interdependent in a socialized context.

Conclusions and Future Readings

Social capital has become one of the most active areas of analysis and debate in social science over the two last decades (and before). Social capital is an interesting concept to explain social dynamics. The social capital literature represents a wide range of definitions supported by different ways of thinking: neoclassical, Keynesian, and Marxist. But more generally, social capital represents a critical aspect of the marginalist economical approach. According to Granovetter or Coleman and the others, economical phenomena are

Social Capital of the Entrepreneur, Table 2 Resource potential of the entrepreneur, elements of definition

Resources	Main characteristics
Knowledge	Tacit knowledge obtained from the family
	Scientific and technical knowledge learned at school
	Knowledge obtained through social relations
	Knowledge obtained through professional experience
Financial resources	Personal savings
	Friendly money: parents, friends, and so on
	Bank loans
	Financial aid from institutions (e.g., public aid)
Social relationships	Seed money from another individual
	Informal relations (family, friends, neighborhood, colleagues, etc.)
	Formal relations (state, banks, other enterprises, institutions in general, etc.)

Source: The authors

embedded in the social context. In this way, social capital can be considered as a tool of sociological analysis in an interdisciplinary perspective, even if it is impossible to arrive at a consensus about its definition.

Cross-References

- ▶ [Business Climate and Entrepreneurship](#)
- ▶ [Innovation and Entrepreneurship](#)
- ▶ [Knowledge Capital and Small Businesses](#)
- ▶ [Network and Entrepreneurship](#)

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Social Change

- ▶ [Social Innovation](#)

Social Controversy

- ▶ [Antitechnology Movements: Technological Versus Social Innovation](#)

Social Design

- ▶ [Applied Design Thinking Lab and Creative Empowering of Interdisciplinary Teams](#)
- ▶ [Preparing a “Creative Revolution” – Arts and Universities of the Arts in the Creative Knowledge Economy](#)

Social Ecology

- ▶ [Quintuple Innovation Helix and Global Warming: Challenges and Opportunities for Policy and Practice](#)

Social Entrepreneurship

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Synonyms

[Entrepreneur](#); [Social networks](#)

Introduction

Social entrepreneurship is commonly used to qualify all economic initiatives that serve social and/or environmental mission and that reinvest a large part of their surpluses in support of their mission. Although this definition is not yet stabilized and its boundaries remain unclear, it focuses on the aim to achieve both economic efficiency and social innovation. It takes place within a context of great uncertainty about the future of welfare states and their capacity to meet new societal needs, of financial and budgetary constraints that force public authorities to develop new forms of interaction between public and private sectors, and therefore, of need to build new responses to societal challenges that are sustainable socially, economically, and environmentally. Within this context, all sorts of initiatives that can be qualified as social innovations are gaining interest.

Although interest of social entrepreneurship seems to be recent, as far as its capacity to reconcile private and social value creation is concerned, the first works on social entrepreneurship have to be found in the 1980s. Social entrepreneurship appears as a phenomenon not well recognized that has gained interest both in the USA and in Europe, given its capacity to overcome the opposition between profit and social value creation.

Social Entrepreneurship, Social Entrepreneur, and Social Enterprise: Is There Any Difference?

These three notions are used quite indistinctively in most of the Anglo-Saxon literature, although the choice of one term out of another is not neutral.

Rooted in Entrepreneurship

These three notions have in common to share the same roots in the term “entrepreneur,” which is associated with creating value and change in the economy. As explained by Dees (1998, p. 1), the origins of the word entrepreneur have to be

found in the seventeenth and eighteenth centuries. For Say, in the early nineteenth century, the entrepreneur “shifts economic resources out of an area of lower productivity and into an area of higher productivity and greater yield” (Dees 1998, p. 1). One century later, Schumpeter considers that entrepreneurs are the “change agents in the economy” and create value in the sense that, “by serving new markets or creating new ways of doing things, they move the economy forward” (Dees 1998, p. 1). More recently, as described by Dees (1998), Drucker added a dimension of “opportunity”: “An entrepreneur always searches for change, respond to it, and exploits it as an opportunity.” A last dimension can be added to the definition of “entrepreneur.” According to Stevenson, entrepreneurs pursue “the opportunity without regard to resources currently controlled.” In other words, the entrepreneur is able to mobilize new resources or to find new combinations of resources to achieve his objective.

Putting together all these dimensions of the notion of entrepreneur, Dees (1998) proposes to consider social entrepreneurs as entrepreneurs with a social mission. However, the value created by the pursuit of this social mission, which is designed as a social value, cannot be easily measured by the market mechanism (that measures the private value created). Based on these dimensions, Dees (1998, p. 4) proposes the following definition:

Social entrepreneurs are “playing the role of change agents in the social sector by adopting a mission to create and sustain social value, recognizing and relentlessly pursuing new opportunities to serve that mission, engaging in a process of continuous innovation, adaptation and learning, acting boldly without being limited by resources currently in hand, and finally exhibiting a heightened sense of accountability to the constituencies served and for the outcomes created.” For Martin and Osberg (2007 p. 34), the difference between entrepreneurship and social entrepreneurship lies “in the value proposition itself.” The entrepreneur anticipates and organizes his value proposition to serve the markets and create financial profit, while the social entrepreneur anticipates and organizes his action in order to create “large-scale” benefits for society. The value proposition of a social entrepreneur does

not need a market to pay for this proposition but targets excluded, marginalized, or neglected parts of the population. In their proposition, the notion of opportunity is also a central one. The social entrepreneur identifies an opportunity to improve the situation of the marginalized group of the population. In that sense, the social entrepreneur, through direct action, aims to create and sustain a new equilibrium.

Social Entrepreneurship or Social Entrepreneur?

The notions of social entrepreneurship and social entrepreneur have gained popularity since the 1990s, in the USA as well as in Europe. Today, these terms recover a wide range of organizations, since it is used to qualify nonprofit organizations that start for-profit or earned income ventures, social purpose business ventures, *social businesses*, or social enterprises.

For Martin and Osberg (2007, p. 30), this increasing popularity leads to the inclusion of various activities that create a social benefit in this notion, which can be confusing. They consider that “the definition of social entrepreneurship today is anything but clear” and argue in favor of a more “rigorous” definition. They propose to distinguish social entrepreneurship from social service provision and from social activism (Martin and Osberg 2007, p. 36). The critical distinction from social services ventures lies in the fact that the latter does not “break out of their limited frame.” They do not change the system and build a new equilibrium, less unfair for the underserved groups of the population. Considering social activism, the main difference comes from the fact that the social entrepreneur implements a direct action, while social activists try to bring some change through indirect action, by militant missions toward governments for instance.

Some distinctions are however made in the literature. As suggested by Mair and Marti (2006), the notion of “social entrepreneur” focuses on the individual characteristics of the entrepreneur and his behavior. As stated by Drayton (2002), social entrepreneurs have special traits and a strong ethical fiber. Social entrepreneurs have a vision of the social change they want

to achieve, do take risks to do so, are creative, and have leadership skills. By contrast, the notion of “social entrepreneurship” is a way to put more emphasis on the process, on the organizational and collective dimensions of the entrepreneurship. The notion of “social enterprise” refers to the “tangible outcome of social entrepreneurship.”

Different Schools of Social Enterprise

Social enterprise emerged, approximatively, at the same period of time in both sides of the Atlantic, although without any connection between them until the mid-2000s (Defourny and Nyssens 2010). In the USA, the Social Enterprise Initiative has been launched in 1993 by the Harvard Business School, followed by large universities and foundations that develop support programs to social entrepreneurs. Different entrepreneurial initiatives with a social mission emerged in the USA in the 1980s, mainly within the nonprofit sector, but it was not until the 1990s that they were put together within the concept of “social entrepreneurship.” In Europe, its emergence is associated with the development of social cooperatives in Italy, recognized by a specific law in 1991, and with the work of the EMES (EMergence des Entreprises Sociales) European Research Network during the 1990s.

Since then, the notion of social enterprise has been developed by different schools that are usually separated in two groups, although not all the works on social entrepreneurship can fit exclusively within one of the schools (Borzaga and Defourny 2001; Dees and Anderson 2006; Defourny and Nyssens 2010).

The “Earned Income” School of Thought

The “earned income” school of thought defines social enterprises as nonprofit organizations that search for alternative funding strategies. Developing commercial activities was a way to solve their funding problems since they had to face important cutbacks in public grants and encountered increasing difficulties to mobilize private donations from individuals or foundations. These organizations therefore develop

market-oriented economic activities that generate fees that will be reinvested for their social purpose. This earlier approach has then been enlarged to consider as social enterprise all types of organizations, nonprofit as well as for-profit ones, that develop market-oriented economic activities serving a social purpose.

For Defourny and Nyssens (2010, p. 20), the notion of *social business* developed by Muhammad Yunus (2007) falls within this approach. For Yunus, a *social business is a non-dividend company* that does not distribute all its profits and a *no loss company*. A company that is not able to cover its production costs and reimburse its investors while serving its mission is not a *social business*. Social businesses differ from charities since they do not depend on donations nor on public subsidies to develop their activity. However, the notion of social business is now used to qualify a wide spectrum of organizations that allow for a limited redistribution of profit. The organization can therefore be “for-profit” or not-for-profit. The notion of *social business* also characterizes the new organizational models of multinational firms aimed at helping the poor to access to market, as in the *bottom of the pyramid* approach (Richez-Battesti 2010).

The “Social Innovation” School of Thought

The social innovation school gives a central role to the social innovation dynamic that is most of the time driven by a social entrepreneur, who possesses crucial personal characteristics to pursue his social mission, such as dynamism, creativity, and leadership. Social innovation is here personalized and reflects the priority given to the individual instead of to the organization. The definition of Dees (1998), mentioned above, illustrates this line of thought. The social entrepreneur is a change maker; he possesses the classical characteristics of an entrepreneur but is motivated by a social mission. This view of social innovation has been supported by foundations such as Schwab and Ashoka from the beginning of the 1980s that still encourage the development and the professionalization of social entrepreneurs, in particular with

a nonprofit status. This conception is also at the heart of training program developed by higher schools in France, such as the program implemented by the Social Entrepreneurship Chair of the ESSEC school.

Social entrepreneurship can therefore be considered as a social innovation or as an opportunity to create social innovation. For Phills et al. (2008), however, both notions, social entrepreneurship and social enterprise, are not appropriate to analyze all forms of creating social change, because they have their roots in the nonprofit sector. These authors argue that the notion of social innovation is more accurate since it allows including all kinds of organizations that produce social change, such as public, for-profit, or nonprofit organizations. “Innovation can emerge in places and from people outside the scope of social entrepreneurship and social enterprise” (Phills et al. 2008, p. 37). These authors consider social innovation both as a process and as a result and focus on the analysis of the processes that lead to the emergence of social innovation.

For instance, social innovation could emerge from a collective process organized by multiple actors at the territorial level in order to create social value to solve social problems (Klein and Harrison 2010). From this perspective, social innovation is the result of cooperation processes between local actors that coordinate to meet unsolved social problems. Such processes rely on participative dynamics and on the combination of different types of resources (market, public, and voluntary ones). This leads these authors to characterize social innovation as inclusive and participative.

Beyond the diversity of these two schools of thought, Defourny and Nyssens (2010, p. 21) mention, however, that there exists an effort toward the emergence of a common vision of a social enterprise in the USA that would include the following criteria (cf. Emerson 2006): the search for social value creation/impact, social innovation, the use of market resources and the use of managerial practices, whatever the statute of the organization, nonprofit or for-profit, public or private.

Social Enterprise in Europe

The European model of social enterprise emerged in the 1990s with the work of the EMES European Research Network, in relationship with the development of new forms of enterprises coming from the third sector, such as social cooperatives in Italy (1995), social purpose companies in Belgium (1995), or social solidarity cooperative in Portugal (1998) (Gardin 2010). The EMES Network proposed a conceptual definition of social enterprises, characterized by a set of nine criteria classified within three groups:

- The first set of criteria deals with the economic dimension of their activity (a continuous activity producing goods and/or selling services, a significant level of economic risk, a minimum amount of paid work).
- The second set of criteria concerns their social and inclusive dimension (an explicit aim to benefit the community, an initiative launched by a group of citizens, a limited profit distribution).
- And the last set of criteria characterizes their governance structure (a high degree of autonomy, a decision-making power not based on capital ownership, and a participatory nature, which involves various parties affected by the activity).

These criteria contribute to build an “ideal type” in Weber’s terms, i.e., an abstract construction that enables researchers to position themselves within the “galaxy” of social enterprises and to draw the boundaries of what can be considered as a social enterprise (Defourny and Nyssens 2006). This ideal type characterizes social enterprises by a complex mixture of goals (Evers 2001); a resource mix that combine market, public, and voluntary resources; and a multi-stakeholder organization. Such a definition of social enterprise is not that different from the definition of the social economy and builds a bridge between different components of the third sector, such as cooperatives and nonprofit organizations (Defourny and Nyssens 2006, p. 7).

A Largely Debated Notion

Social entrepreneurship, social entrepreneur, and social enterprise are similar notions that

hide some elements of controversy, in particular if we compare the European approach with the American schools of thought.

As pointed by many authors, such as Young and Salamon (2002), the European vision gives more emphasis to the governance model adopted by the social entrepreneur. Participation and democratic organization are highlighted in the EMES ideal type of social entrepreneur.

Note also that the resource mix is larger in the European model since it emphasizes the necessity to combine not only market-related resources but also public subsidies and private donations (Nyssens 2006).

Lastly, the European model explicitly allows for a limited redistribution of the surpluses generated by the activity, which is not always the case in the American schools of thought. Within this perspective, mutual organizations, work integration organizations, and cooperatives can be considered as social enterprises.

We therefore propose to locate the demarcation line between the American models and the European ones in the recognition – or not – of the existence of a third economic model, at the crossroads of market, public policy, and civil society (Nyssens 2006).

For the first, social entrepreneurship relies on the characteristics and on the vision of an individual within the frame of a “new kind of capitalism that serves humanity’s most pressing needs” (Yunus 2010).

This conception can be related to the increasing recognition of the corporate social responsibility of any type of enterprises. However, if the contribution to social welfare improvement is only associated to socially and environmentally sustainable practices, these firms do not fall into our definition of social enterprises. The contribution to social value creation has to be direct and central to the aim of the firm in order to consider it as social enterprises. Nevertheless, in some cases, the boundaries with the corporate social responsibility can be permeable. Social enterprises indeed use earned income strategies to pursue a double or triple bottom line. Some therefore propose to

debate on the emergence of the “welfare enterprise” (Salmon 2011).

For the European models, the social enterprise is the result of a collective process, to be found in the origin of the project as well as in the governance structure of the organization, leading to the constitution of multi-stakeholder organizations (Borzaga and Mittone 1997; Pestoff 1998; Petrella 2008). The collective dimension of social enterprises also emerges in the collective benefits that they are aimed to create. Social enterprises are therefore part of a third sector, separated from the private capitalist and the public sectors.

From this perspective, it is important to stress that social enterprises, in the European model, develop their activities in a complementary interaction with the public action. The European approach recognizes a larger diversity of organizations that interact within a more complex and diversified environment than in the American approach (Ghezali and Sibille 2011). In the USA, there is a tendency to consider social enterprises as substitutes for public action in order to overcome its shortages. Social entrepreneurship is often presented as a way to develop entrepreneurial approaches to meet social problems, since governmental and philanthropic initiatives are not able to solve all the social problems (Dees 1998). Social entrepreneurs will try to develop more efficient ways of solving social problems and are seen as an opportunity to substitute social entrepreneurship to direct public intervention, through the development of markets – or quasi-markets – of welfare. By contrast, one could consider social entrepreneurship initiatives as an opportunity to redesign public policy, in particular through the adoption of more participative processes of public action (Nyssens 2006).

An institutional support to social entrepreneurship at the international level governments of different countries, along with international organizations such as the OECD and more recently the European Union, has contributed to the recognition, the legitimacy, and the development of social entrepreneurship or social enterprise around the world.

In countries such as Italy, the emergence of social cooperatives contributed to the thinking on social enterprises from the beginning of the 1990s and the works of the EMES Network in particular. In France, the agency of valorization of socioeconomic initiatives (AVISE) helped to spread the notion of social enterprise, in connection with the EMES definition on the one hand and the creation of a new legal status of collective interest cooperative in 2001.

In 2002, the British government launched a national strategy in favor of social entrepreneurship. The definition proposed in the document called “Social Enterprise: A Strategy for Success” published in 2002 (p. 13) has become the most exhaustive and used definition of social entrepreneurship: “A social enterprise is a business with primarily social objectives whose surpluses are principally reinvested or that purpose in the business or in the community, rather than being driven by the need to maximise profit for shareholders and owners.” The Danish government also started to work on a national strategy to support social innovation within the same period of time.

The Skoll World Forum on social entrepreneurship, in relationship with the Oxford University, facilitated the discussions, debates, and critical issues around the question of “Social Entrepreneurship: Shifting Power Dynamics,” by exploring how social entrepreneurs find their way through and can influence the power dynamics within their approach that searches for change. Nearly 800 delegates coming from more than 60 countries took part in the first meeting of the most important social entrepreneurs. Discussions, debates, and seminar sessions were organized during three days and three nights by famous personalities coming from social sectors, universities, financial organizations, and political representatives with the aim to foster innovative solutions to the most urgent social needs at the world level. The Skoll World Forum also puts into the discussion the fact that the narrowing of credit opportunities highlights the need to increase the financial sustainability of innovative initiatives and reinforce the search processes toward charities and social enterprises.

At the international level, the OECD proposed a definition of social enterprise that built upon various examples analyzed in its member countries (North America, Europe, Japan, Australia, Mexico, etc.): “Social enterprises are organisations that take different legal forms across OECD countries to pursue both social and economic goals with an entrepreneurial spirit. Social enterprises typically engage in delivery of social services and work integration services for disadvantaged groups and communities, whether in urban or rural area. In addition, social enterprises are also emerging in the provision of community services, including in the educational, cultural and environmental fields. The social enterprise refers to any type of private activity.”

Since the financial crisis of 2008, the European Commission launched a package of actions to encourage a growth process that is more inclusive, emphasizing the role of social innovation and social entrepreneurship. For instance, the social business initiative falls within this set of actions (social business initiative, *COM (2011) 682 final*). It defines a social enterprise as follows: “A social enterprise is an operator in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in particular, involve employees, consumers and stakeholders affected by its commercial activities.” It is interesting to note that the governance structure reflects, in one way or another, the general interest objective. Within this initiative, an action plan to support social entrepreneurship has been elaborated with the identification of key actions aimed at improving the access to funding, increasing the visibility of social entrepreneurship, and improving the legal environment.

Conclusion and Future Directions

Social entrepreneurship is a different kind of entrepreneurship aimed at creating social value,

i.e., large-scale benefits for society. Everyone seems to agree on the fact that social entrepreneurs identify opportunities to foster change in society in order to solve new social problems, by providing new ideas and new types of services and by searching for more efficient – or new – combinations of resources. Social entrepreneurship is therefore generally associated to social innovation. Nevertheless, social entrepreneurship is still a controversial notion. Current debates are focusing, on the one hand, on the boundaries of these notions, between market, public policy, and civil society. On the other hand, debates concern the organizational form that social entrepreneurship will take, being led by an individual or being the result of a collective process, issue that will be determinant for the governance structure adopted by social enterprises.

Cross-References

- ▶ [Diversity and Entrepreneurship](#)
- ▶ [Entrepreneur](#)
- ▶ [Entrepreneur in Utopian Thinking](#)
- ▶ [Entrepreneurship and Social Inclusion](#)
- ▶ [Microfirms](#)
- ▶ [Proximity Relationships and Entrepreneurship](#)
- ▶ [Social Capital](#)
- ▶ [Social Innovation](#)
- ▶ [Social Networks and Entrepreneurship](#)
- ▶ [Socialized Entrepreneur, Theories](#)

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Social Innovation

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Synonyms

[Innovation](#); [Social change](#); [Social invention](#)

The Novel Creation, Variation or New Combination of Social Practices

For decades, industrialized countries have attributed increasing relevance to innovation as a key resource for economic growth, making it a top priority for management and research in the business sector. By comparison, social innovation long remained on the periphery even of the social sciences, and was usually neglected by policy-makers and most of the stakeholders in innovation systems. Apart from the mainstream innovation theory and innovation research, still based on the seminal work by Schumpeter (2006), only few authors referred to the topic of social innovation until the end of the twentieth century, some of whom used similar terms such as social invention. Even fewer was

the number of organizations, literally just a handful, that devoted explicit efforts toward social innovation up to the year 2000.

The situation changed drastically during the first decade of the twenty-first century. The attention paid to social innovation and the resources involved in the promotion, research, and implementation of social innovation increased, most remarkably after 2008, when the concept became the subject of mainstream policies in high places. US President Obama established an “Office of Social Innovation” at the White House. In 2009, too, President Barroso of the European Commission declared social innovation a top priority (Press Release IP/09/81): “The financial and economic crisis makes creativity and innovation in general and social innovation in particular even more important to foster sustainable growth, secure jobs and boost competitiveness.”

Key Concepts and Definitions

Mentioning social innovation in the same breath as the crisis of the years since 2008 is more than mere coincidence. Indeed, it is the magnitude of the societal transformations in the present that stimulates the quest for new solutions in order to gain control of socioeconomic development. What is observed and depicted as *social change* is a perpetual process which from time to time runs more smoothly than under the current pressures of globalization. Yet there are factors affecting the dynamics of change, e.g., increasing life expectancy, everyone likes and no one wants to relinquish. As a consequence, improvements in the human conditions of living turn out to be the “grand challenge” of an aging society, necessitating social innovations to cope with it. At the same time, there are dynamics of change interfering with the broadly appreciated way of life, e.g., environmental pollution, excessive wealth next to rising income disparities, conflicts, and climate change, which require changes in behavior and call for social innovation.

Though social change – the wider compass of social innovations – results to a certain extent from human activities in all walks of life, such

as politics, science, industry, or culture, it does not necessarily follow targeted interventions. In sociology, referring to social change means analyzing processes of change in social structures, institutions, culture, behavioral patterns, and states of consciousness. Alterations of this kind may derive from impacts beyond societal control, e.g., from the volatile stream of social development and cultural evolution. Change sometimes remains in line with sources from previous stages of development, and sometimes change consists of major upheavals like revolutions or the collapse of political systems. Hence, change *may* be influenced by social innovations, i.e., intentional and successful attempts to modify existing social practices or to enable new ones.

As usual in discourses concerning new concepts, several definitions are proposed by researchers and practitioners. Some are rather descriptive, aiming at more or less metaphorical indications of what may be highlighted as “social” in an innovation. Other approaches aim at the analytical and scientific differentiation of social innovation from common types of innovation known as commercially successful new products, processes, marketing, and organizational novelties. The latter are clearly defined, identified, and measured according to the so-called Oslo Manual (OECD & EUROSTAT 2005), enabling reliable and accountable classification and comparison of types of innovation among enterprises and business sectors. Their economic impact on GDP, regional development, countries, EU or NAFTA etc. can be measured. Such methods have not yet been established likewise to identify and analyze social innovations with the appropriate accuracy.

A frequently chosen approach in defining social innovation is to use examples and point out the social objectives or social processes involved. Most prominent is the following one (common in European Commission reports and other publications, in exactly this form or in some variation): “Social innovations are innovations that are social in both their ends and their means – new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create

new social relationships or collaborations. They are innovations that are not only good for society, but also enhance society's capacity to act. Social innovations take place across boundaries between the public sector, the private sector, the third sector and the household" (DG Enterprise 2012; Murray et al. 2010; cf. also BEPA 2010).

This concept of social innovation helps to promote and fund socially innovative projects. By assuming an a priori position based on the social intentions involved, it includes the relevance of social needs, their effectiveness, and interaction (relations, collaboration). However, since any innovation has some social dimension pertaining to "social needs" one way or the other, thus affecting human relations, cooperation, and collaboration, it may even become difficult to determine what is *not* a social innovation. The decisive criterion should not be a social objective ("ends") and "social means," because an innovation may be qualified as social only after implementation by the assessment of its *results* and actual impact. Moreover, using the term "social" as a specific feature calls for the definition of what is "social." In the respective literature, it seems that "social" is applied as a normative term and perceived as good for society as a whole: "The value [of social innovation] created accrues primarily to society as a whole rather than private individuals" (Phills et al. 2008, p. 36). Yet, as with any innovation, social innovations are usually targeted at serving the needs of specific individuals or groupings. Social innovations appreciated by target groups may well be met with depreciation by other groupings or entities affected in other than intended ways.

'Social in its ends and in its means' is a useful formula (. . .), because it conveys an idea of social as 'good for many' or 'socially desirable', as socially 'valuable'. Nevertheless, we have come to learn that not everything which is intended as good for many may eventually turn out to be considered as good from many. (. . .) In strictly scientific terms, defining 'social innovation' excludes using the terms social and innovation in the definition. Strictly speaking, the definition 'social innovations are innovations that are social both in their ends and in their means' is tautological. What we can take from this definition is that social innovation is intentional, meant to change something in

what people do alone or together to the better, at least as they perceive it. The intentionality of social innovation is what distinguishes it from social change (Franz et al. 2012, p. 4).

Any innovation is socially *relevant*, be it in the process of development and implementation or when looking at social outcomes. The specificity of a "social" innovation compared with what is generally meant by "innovation" without a prefix is due to what kind of value accrues from it in first place, and how this value is owned and impropriated. In the case of what is regularly perceived as innovation, it is *economic value*, produced and owned by enterprises, and *social value* in the case of social innovation, produced and owned by manifold players across society (including the corporate sector). "Fast food," for instance, has very effectively changed behavior and relationships by meeting unmet needs in the wider realm of new lifestyles. It continues to exert enormous social impact (including the emergence of severe health problems), while meeting existing and even newly created needs. Yet it is business driven, the value it produces is clearly defined economic value in first place, and further innovations in that area are intended to augment the respective outcome, irrespective of whether they respond to new social needs. In parallel, within the same society, though in different fractions, it stimulates another set of social needs, leading to counteracting social innovations like the "slow food" movement, whereby social value is in the foreground, even if economic value is obtained as well. This example demonstrates that the understanding of what is considered "social" may not only vary, but can even include totally contradictory meanings.

It is therefore imperative neither to presume that social means and ends are always good for society, nor to perceive social innovation as something totally distinct from innovation as such. What is required instead is a concept of innovation that includes social innovation among known sorts of innovation, yet supports the determination of specific properties. In order to exclude an a priori posit of what *should* be social in an innovation, for this reason then labeled "social innovation," an *analytical*

definition of social innovation must allow identify the “social” properties of an innovation based on empirical assessment. This can be established only *ex post*, because whether or not a social objective is achieved, and an idea or model etc. actually becomes effective is only shown posterior to implementation.

A verifiable scientific definition of social innovation requires avoiding the inclusion of the self-referential terms “social” and “innovation,” on the one hand. On the other, two essential features are imperative. One is to meet the requirements of an inclusive and comprehensive paradigm of innovation to afford the possibility of measuring success and impact in *comparison* with the established concept of innovation. Another necessity in defining social innovation is to ensure a definitive *distinction* from other types of innovation, or else it would not make sense to use the specific term of social innovation at all.

1. *Comparability* with the principles of the logic of innovation in general. Theory, practice, and research concerning social innovation must follow a similar rationale regarding what is constituent of commonly defined “innovation,” i.e., a “new combination of production factors” (Schumpeter 2006), leading to *commercialized* new products or processes (OECD & EUROSTAT 2005). While the decisive criterion of innovation is commercialization (success on markets), the specific type of *social* innovation similarly needs to be assessed against an appropriate criterion enabling the determination of success. Even if social innovation takes place in the business sector, it cannot be gauged by the same token as the classic innovation, which is *commercial* success on *markets*. By comparison, the success of social innovations should first be determined by analyzing the scale, pace, and range of the *adoption and use* of new solutions or social practices by *social entities*.
2. *Distinction* of what a social innovation is compared with business innovation and with what is not an innovation at all (like reform or social change). Though there is a similarity in the rationale and social innovations may also provide economic success in terms of income,

employment, and related factors, measuring social impact must reach out further to the *quality of life* (e.g., diversity, stability of social relations, solidarity, and social cohesion). Thus, the second key element of what denotes the success of social innovation demands the identification of outcomes. The distinct nature of social innovations needs to be expressed by social manifestations (like products or processes in business corporations), which can be considered *social facts* (Durkheim 1982) or *social practices*. These may be standardized behavior according to norms and other rules of social control. The latter were at the core of an early, yet neglected definition of innovation – without prefix, and with no direct reference to the economic sphere – describing innovation as “changes or novelties of rites, techniques, costumes, manners and mores” (Kallen 1932, p. 58).

The following definition refrains from the tautologous circle of declaring, abridged, “social innovations are social,” and enables comparability with the scientific basics of established innovation theory as well as distinguishing social innovations from business-driven ones: “Social innovations are new practices for resolving societal challenges, which are adopted and utilized by individuals, social groups and organizations concerned” (ZSI 2012, p. 2). To be very succinct and paraphrase the famous quote from Schumpeter “innovations are new combinations of production factors,” social innovations may be considered “new combinations of practices to varying social settings” (possibly affecting social change). New practices can consist of modified procedures in decision making, emerging patterns of communication and collaboration, and the adoption of diverse roles and relations. Such novelties may be completely new, adapted, or imported from other fields of action and experience. Yet, wherever the major impulse comes from, social innovations are not ready-made products to be bought and applied, but *processes* which require acceptance and – usually – adaptation. The threshold to qualify as a social innovation is the improved impact of new practices on a specific social issue, compared with

previous and competing practices, as well as with not taking any action at all. However, impact will show only after implementation; therefore, adoption and the factual utilization of the proposed and more or less tested innovative practices by persons, groups, and other elements in society concerned are decisive.

Theoretical Background and Issues

Innovation, referring to products, technological devices, and processes, is often perceived as clocking progress in technology and economics. But there is no static economy, waiting in equilibrium for innovations to kick-off new developments. The basic principle of innovation ever since Schumpeter has been to conceptualize innovation as a necessity responding to restless dynamics. Innovations are indispensable in order to maintain the continuity of business processes and organizations in a permanently changing environment: “The opening up of new markets, foreign or domestic, and the organizational development . . . 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 of capitalism” (Schumpeter 1975, p. 82). Because of this “creative destruction” in capitalism, business enterprises, whether large or small, are forced to innovate, that is to identify and implement ever “new combinations of production factors.”

By comparison, social change is continually ongoing, too, in variable dynamics just as in the economy, and influenced by it to an even greater extent. Indeed, it is not necessarily technology which changes the structure of society, as currently from the “industrial” to the “information” or “knowledge society.” Though this phenomenon is still subject to scientific and public discourse, it has been demonstrated that any existing formation of society continuously creates demands for new solutions to issues it entails – either by its successes or failures (cf. Beniger 1986). Taking this approach to determine and analyze social innovations, the notion

of intentionality does not arbitrarily result from pure will or sudden creativity, but rather from need and necessity in the wake of persistent social change. Nevertheless, innovation requires pioneers who take the lead as innovators or first movers, actions that may be met – from various sides – with appreciation as well as disapproval or rejection. Like every innovation, social innovations must overcome resistance, degrees of which may differ a lot depending on the areas of change as well as on the social or historical environment in which they are proposed. This is why in social innovation research and practical implementation, the composition of networks, stakeholder analysis, and comprehension of interest groups and their power – to ignore or define or “make” an issue – are of crucial relevance.

From the viewpoint of theoretical consideration, social innovation expands the traditional concept of innovation, prompting major steps toward a new paradigm of innovation to fit the dynamics of the globalized post-industrial society of the twenty-first century (cf. Howaldt and Jacobsen 2010). The emergent world society, preferably termed information society or knowledge society, needs innovations far beyond the sector of industry or business as a whole. Though business innovations and new technologies will also be necessary in the future, social innovations will become indispensable to make new products and process innovations beneficial in terms of economic, social, and environmental sustainability. In addition, the development and shaping of the public sector (public services, security, infrastructures, etc.) as well as of the civil society sector (NGOs, churches, citizens’ initiatives, etc.) call for social innovations of many kinds, numerous in scope and range. Thereby, the critical challenge is to identify how social innovations contribute to the accomplishment of social objectives and to measure the *social outcome* for whom in society.

In the BEPA-Report (2010, p. 26), a differentiation is emphasized between the *process dimension* and the *output dimension* of social innovations: “The process dimension . . . implies that new forms of interaction are

established [whereas] ... the output dimension ... refers to the kind of value or output that innovation is expected to deliver: a value that is less concerned with mere profit, and including multiple dimensions of output measurement.” In addition, a very valuable distinction is provided by denoting three particular dimensions of social innovations according to characteristic objectives and intended impacts:

- ‘*The social demand perspective* ... innovations that respond to social demands that are traditionally not addressed by the market or existing institutions and are directed towards vulnerable groups in society.’ ...
- ‘*The societal challenge perspective* ... innovations that respond to those societal challenges in which the boundary between the social and the economic becomes blurred and that are directed towards society as a whole’ ...
- ‘*The systemic changes perspective* ... innovations that contribute to the reform of society in the direction of a more participative arena where empowerment and learning are both sources and outcomes of well-being.’ (BEPA 2010 edition, p. 36 ff.)

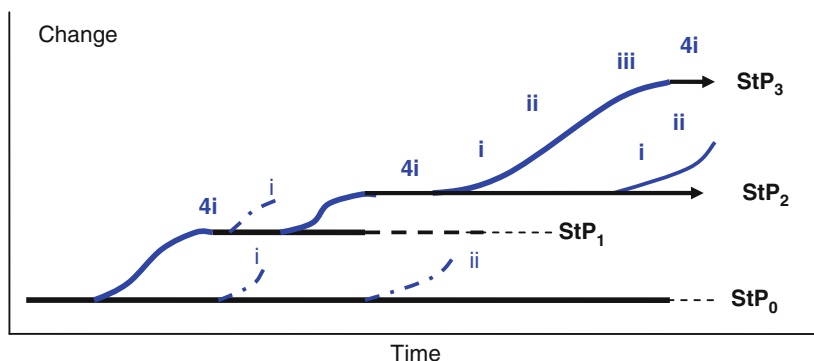
Social innovations are not determined solely by the potential of ideas, but rather by the extent of realizing given potentials. These depend on whether the “invention” offers benefit to target groups, and thus, a social idea transforms into a social innovation because of utilization of the new practices and their dissemination. As mentioned earlier, social innovation should be considered a *process*, consisting of stages from the generation of an *idea* (“*ideation*”), on to *intervention*, *implementation*, and *impact* (a “4-*i*-process”). Ideas (inventiveness and creativity) underlie the concepts and measures proposed, which become innovations by utilization after targeted intervention and successful implementation.

If implemented successfully, social innovation entails impact, dissemination and further upscaling, and replication may take place. At best, it will be adopted and utilized to the extent of what is called “saturation of markets” in the case of business-driven innovations.

Regarding social innovations, the equivalent is acceptance and usage by social groups and organizations possibly concerned. New practices may become regular practices, even standard behavior and perhaps formally institutionalized. As a result, successful social innovations then complete their *life cycle*. Once a former new practice (e.g., the people concerned adopt new roles or reshape their relations, or comply with norms, mores, or values) becomes standard and institutionalized, it ceases to stand out as an innovation. All the same, as novel practices leave previous standards behind, the new standard may become subject to new attempts to break the rule: Compulsory schooling, as well as the institutionalization of trade unions were, for instance, major systemic social innovations (actually taking very long to become standard practice). In comparison with these meanwhile established institutions, present-day ideas and intentions to accomplish new practices of schooling and of the representation of labor must appear deviant and in opposition while making their own way toward potential implementation.

Not all attempts to innovate become successful. On the one hand, innovations need to overcome resistance; on the other, the social situation, cultural and other environs like economic preconditions may change, either preventing the success of an innovation or in fact making it irrelevant. In such cases, a new idea (a) is pursued for a while, another one may lead to certain interventions (b) too, but come to a stop before actual implementation. Only if the full cycle, including implementation (c) and creation of impact (d), is completed, will the success of such a process become an innovation. It thus delivers a specific element of change in regard to either meeting a social demand or societal challenge, or stimulating systemic change. Despite the implementation of social innovations, some of which become more or less enduring standards or social institutions, previous standard behavior and rules continue to coexist until a potential decline in relevance and fading out may occur (cf. Fig. 1 for illustration).

One of the most critical issues in the theory and research of social innovation concerns the



Source: Author

- StP₀ Standard practices concerning a specific area of the social system, existing at a certain period of time, possibly continuing next to social innovation(s), i.e. the implementation of new practices
- StP₁ Newly established standard practice following the successful implementation of a social innovation in the area
- StP₂ Newly established standard practice following the successful implementation of a social innovation in the area
- 4i complete life cycle with impact, resulting from newly established standard practices
- - - i idea generated, process interrupted
- - - ii idea and intervention generated, process interrupted
- ii idea and intervention generated, process ongoing
- fading out of standard practices

Social Innovation, Fig. 1 The life cycle of social innovations and their contribution to change over time

tension between the economic and social effects of innovations in general, and of social innovations in particular. Business innovations create *economic value added* and are measured by parameters indicating *economic growth*. By contrast, social innovations prioritize the creation of *social facts* aimed at social change. The parameters applied should be suited to measuring *improvements in quality of life*. Neither economic growth, on the one hand, nor quality of life, on the other, is affected by just one type of innovation. This is why the broader concept of a new innovation paradigm ought to consider all innovations as socially relevant: not only those with the social intentions to alter social parameters, but also those with objectives and rationality criteria to change economic parameters.

Though innovations by definition are drivers of change, they also support the integration and continuance of social systems, since stability may

be achieved by preserving the status quo *or* by adapting to new requirements and challenges. Nevertheless, excessive change creates instability, potentially leading to complete system collapse, the demolition of old systems, and the building up of new ones. Processes of change, often toward integration and disintegration in parallel, are constituent to societal development. The roles played in it by innovations in general and social innovations in particular are of great variety regarding both significance and direction.

Implications for Theory, Policy, and Practice

The *theory of social innovation* calls for further development in three major areas:

- Social innovation theory can facilitate a shift in the overall innovation paradigm, advancing

it to cover innovation processes in all sectors of society. Besides companies, universities, and research facilities, citizens and customers are already considered relevant actors of innovation processes. Civil society and public institutions, however, have not yet been appropriately addressed by innovation theory and innovation research.

- Embedded in a comprehensive theory of innovation, the particular features of social innovation necessitate generic clarification of definition and conceptualization. The theoretical framework must be made compatible with scientific principles applicable to all forms of innovation, and suitable to permit analysis of the dissemination and positive as well as negative effects of social innovations in different sections of society (avoidance of normative prejudice).
- Besides theoretical refinement, methodological improvement is imperative, as there are still no reliable and established indicators and measures to identify and interpret social innovations, as is standard concerning business innovations (products, processes, etc.). Indicators should allow for measuring contributions of social innovation to increasing the quality of life, whereby theory and methods must be able to cover radical (or basic) social innovations as well as incremental ones.

A new paradigm of innovation, including social innovation, on the one hand, and addressing the social dimensions of every innovation, on the other, will support *changes in innovation policies* as well. Currently (2012/13), many national and international strategy papers express the relevance of social innovation, and research programs address topics of social development and social innovation. Moreover, an increasing number of public and private organizations are focusing on the research and promotion of social innovation. Awards for social innovation have become a frequent instrument to highlight success stories. Yet the concept of incubators for social innovation still lags far behind the massive

funding of and public support for business innovation centers which has prevailed for decades. It seems that policy changes only take place after a delay following societal and scientific precursors that need to pave the way for new priorities based on modified frames of reference and value systems.

From a *practical point of view*, the increasing relevance of social innovation must not be neglected, because the most urgent and important innovations in the twenty-first century will be required in the multifaceted fields of social change and societal development. This underlines the necessity and new potentials of the social sciences in the context of transdisciplinary research. Linking science to practice may well be based on dividing topical areas of practical prominence into the categories introduced by BEPA (2010):

- Topical areas suggested under the *social demand* perspective, e.g., employment, education, social services (the UN Millennium Development Goals might be used for guidance)
- Topical areas suggested under the *societal challenges* perspective, e.g., aging societies, migration, climate change, redistribution of energy, and resources
- Topical areas suggested under the *systemic change* perspective, e.g., stopping and reversing financialization, management of abundance, strengthening solidarity and democracy

It should be noted that in practice, social innovations concerning immediate social demand, if implemented and disseminated on a large scale, may lead to systemic change as well as, of course, similarly relevant innovations, e.g., addressing climate change and energy policies. However, as systemic change is needed urgently, it will not automatically derive solely from a large number of various innovations. Systemic change reaches out beyond the usual frame of reference within which humans and societal entities act, while expecting others to behave predictably in similar ways. Thus, an imperative persists to analyze and take measures in favor of

deliberate systemic change, just as individuals, organizations, and public institutions take action regarding social demands.

Conclusion and Future Directions

As outlined above, the scientific foundations of social innovation and the development, testing, and standardization of methodologies are outstanding. The results of such efforts should be compiled in a “*Handbook of Social Innovation*” to be used like the “Oslo Manual” (OECD & EUROSTAT 2005). Research and implementation is essential to build up competencies and capacities, education and training in support of social innovation, as is a specification of the professional profile of social innovators to act as enablers, evaluators, and promoters of all sorts of social innovation in practice.

Cross-References

- ▶ [Antitechnology Movements: Technological Versus Social Innovation](#)
- ▶ [Business Incubator](#)
- ▶ [Collaborative Innovation and Open Innovation](#)
- ▶ [Creative Destruction](#)
- ▶ [Entrepreneurship in Creative Economy](#)
- ▶ [Ideas and Ideation](#)
- ▶ [Innovation Policies \(vis-à-vis Practice and Theory\)](#)
- ▶ [Innovator](#)
- ▶ [Joseph A. Schumpeter and Innovation](#)
- ▶ [Product Innovation, Process Innovation](#)
- ▶ [Social Entrepreneurship](#)
- ▶ [Techno-Globalization and Innovation](#)
- ▶ [Transdisciplinary Research \(Transdisciplinarity\)](#)

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Social Innovation Systems

- ▶ [National Innovation Systems \(NIS\)](#)

Social Invention

- ▶ [Social Innovation](#)

Social Metacognition and Micro-creativity

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Synonyms

[Distributed metacognition and creative ideas](#)

Introduction

While individuals can have creative insights, groups of people often work together to create new ideas. Some group processes can help group members have creative moments in which they generate new, useful ideas (*micro-creativity*). For example, two team members disagreeing over which of their plans to implement can help a third team member recognize each of their flaws and address them by synthesizing useful elements from each into a superior plan. More generally, group members' monitoring (e.g., evaluations) and control (e.g., synthesis) of one another's knowledge, emotions, and actions (*social metacognition*) can aid group micro-creativity (Chiu and Kuo 2009). After describing micro-creativity and social metacognition, the remainder of this entry examines how social metacognition can affect micro-creativity and then discusses its implications for theory, policy, and practice.

Definitions Creativity, Metacognition, Social Metacognition

Big "C," Small "c," and Micro-creativity

Creativity is the generation of new ideas that are useful, and it can occur at different levels: for an entire society, for a single individual, or at a moment in time (Gruber and Wallace 1999). Big "C" creativity affects many people in

a society (e.g., smart phones and continuous improvement process) (Gruber and Wallace 1999). In contrast, small "c" creativity may affect only a single person (e.g., buying a coffee maker to avoid the morning traffic at a local coffee shop) (Gruber and Wallace 1999). Meanwhile, *micro-creativity* occurs when a person creates a useful, new idea at a specific moment in time (e.g., combining two colleagues' suggestions to create a new idea) (Chiu 2008).

Metacognition and Social Metacognition

Individual *metacognition* is monitoring and controlling one's own knowledge, emotions, and actions (Hacker and Bol 2004). For example, Jay believes he has set his alarm clock properly for an important business meeting in the morning, but he is not sure, so he checks his alarm again. Jay monitors his knowledge of the alarm setting, recognizes his lack of confidence in his knowledge and thus, directs himself to act to collect further information about it.

Social metacognition is the social analog to individual metacognition (Chiu and Kuo 2009). For example, a chief executive officer (CEO) often distributes responsibilities among different officers, such as a chief financial operator (CFO) who oversees the firm's finances, a chief operating officer (COO) who oversees the firm's day-to-day operations, a chief technical officer (CTO) who oversees the firm's technology, and so on. After a catastrophe such as an earthquake, the CEO meets with senior staff to hear their assessments of the earthquake's impact on the firm, options for rebuilding the company, and evaluations of these options. The CEO listens to senior staff's ideas, evaluates them, and decides on which actions to take.

A Conversation Illustrating Social Metacognition's Effects on Micro-creativity

Group members' social metacognition can enhance or hinder a person's micro-creativity

(Chiu 2008), as illustrated in the following annotated scenario:

Dave works at Will Not Compute, an onsite computer repair firm for individuals and businesses. He receives a memo to gather some colleagues and develop ideas to improve their firm's marketing. Dave asks his good friend Marc and their coworker Lisa, who often has great ideas, to work together on this initiative.

Dave uses his social metacognitive knowledge of his colleagues to select appropriate team members for this task, namely, employees who can both work together comfortably and generate interesting ideas. Working with coworkers also reduces status effects, which would otherwise hinder free exchanges of ideas and distort evaluations toward higher status colleagues.

Marc and Lisa agree to meet with Dave.

Marc: We already have our own website, isn't that enough?

Lisa: Yes, a website is essential, but we need to get people to go there. Maybe we can use some social networking to get them there?

Dave: Good idea, what if we started providing online coupons by using Group Coolpon?

Marc expresses his negative evaluation of their task goal, thereby sharing his metacognitive knowledge to aid his group members' monitoring and to influence their actions. Citing their current website, Marc criticizes their current task goal by questioning its necessity ("isn't that enough?"), thereby inviting and motivating Lisa's micro-creativity to address his criticism.

By validating Marc's idea ("yes, a website is essential") rather than immediately disagreeing with him, Lisa uses her social metacognitive understanding of his emotions and his thinking to promote his public self-image (give *face*), provide emotional support, build social rapport with him, show shared knowledge, and encourage him to continue listening to her idea. By socially positioning their task responsibility as shared ("we need to") and identifying the inadequacy of the website ("but we need to get people to go there"), Lisa's social metacognitive action validates the task goal and deters Marc's attempt to close the discussion. Furthermore, specifying the inadequacy motivates the group's need for new strategies

(micro-creativity), which she addresses by sharing her new idea ("social networking"). Showing social metacognitive understanding of her colleagues' emotions, thinking, and actions, she socially positions her idea as belonging to the group ("we can") and engages Dave and Marc to consider it by asking them to evaluate its usefulness ("maybe . . .?").

By evaluating Lisa's idea positively ("good idea"), Dave gives face to Lisa, enhances their social relationship, and helps build shared knowledge. Then, he uses their shared knowledge and builds on it by suggesting a specific implementation ("providing online coupons by using Group Coolpon") and showing how micro-creativity can spark further micro-creativity. Next, Lisa asks about "Group Coolpon."

Lisa: Group Coolpon?

Dave: Group Coolpon emails people and invites them and their friends to buy online discount coupons.

Lisa: That's a great idea.

Not familiar with Dave's idea, Lisa shares her self-monitoring with the group and asks for more information ("Group Coolpon?"). Dave explains his new idea to help Lisa understand it, support it, and to build shared knowledge within the group. While Lisa supports Dave's idea, Marc does not.

Marc: Well, like most people, I am not a fan of online shopping because putting personal information online is too risky.

Lisa: Actually, there are plenty of ways consumers can shop online securely, like with PayPal.

Marc: That doesn't change my mind... I still wouldn't do it.

Lisa: I'm sure there are people that feel that way too, but we can focus on the consumers that do shop online.

Marc identifies a potential problem ("personal information online is too risky"), but shows poor social metacognitive knowledge of others by incorrectly claiming that most people share his view ("like most people, I am not a fan"). Lisa quickly and rudely rejects Marc's flawed idea as disconnected from reality ("actually"), makes a counterclaim in the form of a statement ("consumers can shop online securely"), and justifies it with evidence ("like with PayPal"). Using her

social metacognitive understanding of other people, Lisa correctly evaluates Marc's incorrect claim. However, she reveals her inadequate social metacognitive knowledge and control through her rude rejection, which threatens Marc's face (*face attack*, Tracy 2008), reduces his willingness to listen to her, and reduces his micro-creativity.

After Lisa's rude rejection, Marc also responds rudely by declaring Lisa's information as inadequate ("that doesn't change my mind") and maintaining his personal position ("I still wouldn't do it"). By focusing on himself ("I") as a data point to legitimize his own ideas and position himself as a key authority, Marc separates himself from the group. By doing so, he threatens the group's shared responsibility, shared positioning and cohesion, which hinders their cooperation and the group's micro-creativity.

Rather than accelerating the spiral of rude disagreements, Lisa tries to reduce the tension by politely agreeing that some people share Marc's concern ("I'm sure there are people that feel that way too"), by reestablishing their shared positioning ("we can") and compartmentalizing the task ("focus on the consumers that do shop online"). At this point, Dave intervenes.

Dave: Let's do some research on how Group Coolpon works before making a decision.

I can check on contact information.

Lisa: Great, I can look at coupon characteristics.

Dave: Marc, do you want to look at Group Coolpon reviews?

Marc: Sure, that sounds good.

Dave uses his social metacognitive understanding of the tension between Lisa and Marc to suggest collecting more information ("let's do some research on how Group Coolpon works") and postpone the decision ("before making a decision"), which adjourns the discussion and stops the argument that had stunted their micro-creativity. By having Marc and Lisa gather more information, Dave helps them become more comfortable with Group Coolpon, acquire more ideas, and develop more shared knowledge, all of which can stimulate their micro-creativity. If Dave had let Lisa and Marc's disagreement fester, it could have threatened their faces, damaged their social relationship, and hindered their micro-creativity.

Next, Dave and Lisa volunteer to gather specific information ("contact information," "coupon characteristics"). When Dave politely asks Marc to consider collecting other information ("do you want to look at Group Coolpon reviews?"), Marc agrees. As Marc's face has already been threatened by Lisa's face attack, he is more likely to agree to a request from Dave (especially a polite one) rather than Lisa.

Everyone in the group starts an internet search on their laptops for Group Coolpon in hopes to find some useful information.

Marc: I can't believe it. It's supposed to rain all weekend. Great, there go my plans.

Dave: The weather forecast is always changing.

Check later and it will be mostly sunny.

Lisa: Come on, guys. Let's worry about the weekend after our meeting.

Marc gets distracted by a weather forecast ("it's supposed to rain"), which distracts Dave as well ("weather forecast is always changing"). Monitoring her coworkers' attention, Lisa refocuses their attention on the task ("let's worry about the weekend after our meeting") to reduce further distractions and enhance their micro-creativity.

Social Metacognition Effects on Micro-creativity

The above conversation illustrates how social metacognition via understanding others, evaluations, positioning, and questions, can aid micro-creativity (see Table 1). Understanding others through monitoring can aid in selecting appropriate team members who have the necessary talent and who can work together to create new ideas to accomplish a task. As a team works on a task, monitoring enables team members to recognize distractions that snare team members, tensions among them, and differences in their views. After recognizing that team member(s) are distracted, one can redirect their attention to the task to enhance micro-creativity.

Upon recognizing rising tension among team members, one can try to defuse the tension by building agreement among them or by suggesting

Social Metacognition and Micro-creativity, Table 1 Mechanisms by which social metacognition affects micro-creativity

Social metacognition	→ Mechanism → Micro-creativity
Understand colleagues	→ Select appropriate group members with suitable skills who work well together → Micro-creativity → Monitor tension → Reduce tension → Redirect attention to task → Micro-creativity → Monitor their attention → Identify distractions → Return their attention to task → Micro-creativity
Disagree/criticize politely	→ Detect flaws → Motivate correction of flaws → Micro-creativity → Give/save face → Emotional security → Explore ideas → Micro-creativity
Disagree/criticize rudely	→ Face attack → Reduces other's openness to listen → Invites retaliation → Deadly spiral of face attacks -X → Micro-creativity → More tension within group → Decreases group cooperation → Promotes individual positioning (I) → Reduces ideas explored -X → Micro-creativity
Agree/support	→ Support ideas → Give/save face → Emotional security → Explore ideas → Micro-creativity → Support other's ideas → Develop shared foundation of greater knowledge → Stimulate related ideas → Micro-creativity
Correct evaluations	→ Support correct ideas + detect flaws → Develop shared foundation of correct knowledge → Stimulate related ideas → Micro-creativity
Incorrect evaluations	→ Discourage correct ideas + support flaws → Develop shared foundation of flawed knowledge → Stimulate flawed ideas -X → Micro-creativity
Shared positioning (we)	→ Shared responsibility → Shared ideas → Micro-creativity → Shared risk of failure → Lower individual risk → Less anxiety → Greater motivation → Explore ideas → Micro-creativity
Oppositional positioning (I vs. you)	→ Authority based on own experience → Separate responsibility → Individual risk of failure → Less sharing of ideas -X → Micro-creativity

(continued)

Social Metacognition and Micro-creativity, Table 1 (continued)

Question inviting evaluation	→ Invite attention, consideration, and evaluation by others
	→ Develop shared foundation of greater knowledge
	→ Elaborate idea → Micro-creativity
	→ Detect flaw
	→ Motivate correction of flaw → Micro-creativity
Question asking for information	→ Solicit information
	→ Group member(s) fill knowledge gap
	→ Develop shared foundation of greater knowledge
	→ Stimulate related ideas → Micro-creativity
Command	→ Reusing old ideas -X → Micro-creativity
	→ Harm social relationships
	→ Exacerbate status effects
	→ Reduce ideas explored -X → Micro-creativity

Note: -X → indicates “hinders”

a different activity. When team members’ views differ, understanding how to capitalize on their differences can aid micro-creativity, while being frustrated by them hinders micro-creativity.

Evaluations can facilitate micro-creativity through criticisms and agreements, especially correct evaluations. Criticisms identify potential flaws and motivate micro-creativity to address them (or counterarguments and justifications to reject the flaws). However, rude disagreements (such as face attacks) can escalate interpersonal conflict and hinder micro-creativity. As politeness during disagreement is the norm, lack of redress is noticeable and considered impolite (Holtgraves 1997). Hence, criticisms are often rendered polite by accompanying redress such as specifying partial agreements, highlighting shared positioning, and inviting further evaluation through questions.

Meanwhile, agreements can help build emotional and cognitive foundations for micro-creativity. Agreeing with the perceived correct parts of others’ ideas gives/saves face and supports a shared, secure emotional foundation. Emotionally secure group members can listen to and explore a wider range of ideas without fearing personal rejection or embarrassment. Eventually, they can accept rejections of their weaker ideas in favor of others’ stronger ideas. Group members’ agreements also help build a cognitive foundation

of shared understanding of greater knowledge that stimulates their exploration, development, and evaluation of new ideas.

The validity of an evaluation can also affect micro-creativity. Correct evaluations support correct ideas or identify flaws to support the group’s shared, correct understandings, which can launch micro-creative elaborations. In contrast, incorrect evaluations reject correct ideas or accept flawed ideas, resulting in poorer, shared understandings that can stimulate wrong, new ideas and less micro-creativity.

Positioning (Davies and Harre 1990) task responsibilities and ideas as shared among group members is a form of social metacognitive control that helps build a social foundation for subsequent micro-creativity (Chiu and Kuo 2009). Shared positioning can share risk by distributing responsibilities among group members and aid emotional support to enhance motivation. As group members share responsibilities, they also share the risks of failure and its consequences. With less personal risk and a lower cost of failure, collaborators can feel less anxious and more motivated to create new ideas. In contrast, positioning oneself in opposition to others (I vs. you) heightens one’s sense of authority based on one’s own experiences, separates oneself from the group, reduces group cohesion,

reduces sharing of ideas, and hinders micro-creativity.

Questions are a form of social metacognitive control that invites evaluations or solicits information to support a cognitive foundation for subsequent micro-creativity (Chiu 2008b). By framing ideas in the form of questions, a person invites group members to consider an idea, evaluate its validity and usefulness, and create new ideas that elaborate it or address its flaws. Unlike ideas expressed as definitive statements or commands, ideas in the form of questions are more polite, so they are less likely to draw a negative response and prematurely truncate the discussion or discourage identification of weaknesses. Questions that solicit information invite other group members to fill the gap in the group's shared cognitive foundation, which might otherwise hinder exploration, development, and evaluation of new ideas.

Conclusion and Future Directions

Micro-analyses of conversations can show how colleagues can influence one another, specifically how social metacognition (via understanding others, evaluations, positioning, and questions) can aid the creation of new ideas (micro-creativity). Research on social metacognition and micro-creativity is in its infancy with many unanswered theoretical and methodological questions. Theoretical issues include the relationships of micro-creativity to the small "c" creativity of individuals and groups and the Big "C" creativity of society. Furthermore, the relationships between the above social metacognitive actions and micro-creativity might differ along groups and its member characteristics (demographics, individual histories, interpersonal relationships, distribution of relevant competences), contexts (activity, institution, industry, culture), and periods of time (hours, weeks, months, years). In addition to the insights offered by case studies, methodology developments in statistical discourse analysis (Chiu 2008) are needed to systematically study many conversations by many groups. Still, social metacognition's effects on micro-creativity show how team members'

interactions can affect their team creativity, and further research in this area might eventually result in interventions that enhance team creativity.

Cross-References

- ▶ [Creative Knowledge Environments](#)
- ▶ [Creative Leadership](#)
- ▶ [Creative Problem Solving](#)
- ▶ [Intrinsic and Prosocial Motivations, Perspective Taking, and Creativity](#)
- ▶ [Social Psychology of Creativity](#)

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Social Networks

- ▶ [Social Capital of the Entrepreneur](#)
- ▶ [Social Entrepreneurship](#)

Social Networks and Entrepreneurship

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Synonyms

Interindividual and/or Interorganizational interdependence; Social capital

Network analysis has steadily expanded over the past decades within several disciplines, such as sociology, management, and to a lesser extent economics. It has developed both in normative terms and in constructivist analyses based on empirical work. While sometimes limited to a methodological procedure based on mathematical and statistical tools as part of a structural analysis (Lazega 1998), network analysis has a broader theoretical ambition which has become increasingly pronounced.

Ranging from observation of informal ties among individuals to the network as a mode of organization, it concerns, on the one hand, the behavior of individuals or groups of individuals and, on the other, organizations. It therefore covers very varied fields of analysis, from the role of networks in access to employment to their effect on company performance or the dynamics of a territory. The term *social network* suggests connection, circulation, exchange flows, and interactions and is applied to many situations. As Bidart (2008) puts it, “a social network is a relational system.” It can be defined as “a set of relationships of a specific type (e.g., collaboration, support, advice, control or influence) among a set of actors” (Lazega 1994). As a collective actor, the network can also be seen as a third way between market and hierarchy, or between macro-social approaches and individualist approaches (Mercklé 2004). The network is, finally, envisaged through the resources it makes it possible to mobilize, thus

helping to associate the social network with social capital.

This entry first shows the diversity of approaches and the influence of the disciplinary starting points. Networks are then characterized in terms of indicators and methods. The interorganizational dimension of networks is more specifically characterized. Finally, the contributions and limits of network theory are discussed.

The Diversity of Approaches

Social networks are the object of a multiplicity of approaches and methodologies (Mercklé 2004). Thus, as Mercklé stresses, their history is not a linear succession of filiations but a progressive conjunction of initially quite distinct problematics, objects, and methods.

Some authors, such as Forsé (2002), trace the analysis of social networks back to the early twentieth century, pointing to the pioneering research of sociologists like Simmel (1908). Forsé thus stresses that the level of analysis chosen is neither that of the individual nor that of the collective, but an intermediate level, the meso-sociological level, where the social relations resulting from interaction among individuals can be apprehended. Others, such as Mercklé (2004), regard Barnes, in 1954, as the first anthropologist to have made use of the notion of the network. Yet others, such as Eve (2002), identify two traditions of analysis of social networks. The first, known as the Manchester School, is mainly represented by British anthropologists, from the 1950s. They aimed to characterize the configuration of a network of individuals based on an interpersonal approach. The second, social network analysis, was developed by the Harvard School within a structuralist approach. It aims to describe social groups in relational terms and analyze the nodes, whether they concern individuals, organizations, or institutions, distinguishing between formal and informal relationships.

This second school includes the sociologist Mark Granovetter (1973, 1995), who is often seen as a major theorist in network analysis. In the early 1970s, he characterized the formation of social networks and showed their importance in the structuring of contemporary social relations. Granovetter's theory of social networks makes it possible to articulate the individual and the collective by considering that the actions of actors are determined by the social organization and that the ties they form are conditioned by elements outside their own will and specific to the contexts in which they are set. This anchoring of individuals' actions in their context thus renews the analysis of individual behaviors by resituating them in the complexity of systems of social relations. Granovetter's work makes network analysis a genuine theory and not simply a specific method used in the social sciences. One of his contributions is that he characterizes the nature of ties by distinguishing between "strong" and "weak" ties. Strong ties express a high degree of resemblance between two or more persons (family, friends) who are in relationship. They link homogeneous groups and the information that circulates generally remains confined to a restricted group. By contrast, weak ties favor the circulation of individuals and groups or of information in a wider network or "from clique to clique" (Granovetter 1973). These weak ties are those richest in new information and opportunities.

The common feature of these approaches is that they privilege circulation rather than attributes (age, occupation, etc.) and identify and analyze alternative ways of functioning relative to those that are institutionalized. They also have in common the fact that they are pitched at a level of observation intermediate between individual and society (Bidart 2008) and make it possible to observe ties and intertwinings between social networks and institutions. Analyses of networks thus bring to light the mechanisms of the construction of these ties among individuals, collectives, and institutions. In particular, they show how groups are connected by common individuals, and how individuals are connected by common groups.

The Influence of Disciplinary Entry Points

However, depending on the disciplinary entry points chosen, network theory tends to privilege specific angles of observation. While the role of networks as resources for individuals and collectives is a recurrent feature, tensions can be observed between an interindividual approach to networks and a more organizational approach, again illustrating the diversity of analyses.

Structural Analysis of Social Networks as a Theory of Socialization

This approach is mainly developed by sociologists. In this structural perspective, social networks are not a particular mode of social organization but a means of analyzing social structures and examining their roles (Mercklé 2004). As Degenne and Forsé (2004) emphasize, the aim is to understand how a structure constrains individuals' behaviors and the resources they can mobilize, while resulting from the interactions among them. One therefore has to identify regularities in behavior on the basis of several criteria: connectedness (identifying groups according to the links among their members), cohesion (density of relationships), equivalence (looking for similarities among individuals), or the frequency of relationships (Forsé 2008).

Bidart (2008) makes the study of social networks a tool for understanding the processes of individual socialization. She draws up a dynamic cartography of the modes of circulation and anchoring of young people in social universes, bringing out the transversal logics and the multiple memberships. Grossetti (2004) observes the movements of embedding of individuals merging into a collective and the movements of uncoupling when individuals detach themselves from them. In particular, he characterizes the dynamics of interpersonal networks and organizations in enterprise creation.

The ambition of the sociology of social networks is thus to restore to individual behaviors the complexity of the systems of social relations in which they take on their meaning, and to which

they in turn give meaning. A “social network,” in this perspective, is both the set of social units and the relationships that these social units have with one another, directly or indirectly through chains of varying lengths. These social units may be individuals, informal groups of individuals, or more formal organizations, such as associations, firms, or even countries. The relationships among the elements designate forms of social interactions which can also be extremely diverse in nature: They may be monetary transactions, transfers of goods or exchange of services, transmissions of information, perceptions, or interindividual evaluations, orders, physical contacts (from handshakes to sexual relations), and more generally all kinds of verbal or gestural interactions, common participation in the same event, etc.

Social Network Theory as a Theory of Action

More recently, in the field of management, the development of social network theory within the new economic sociology, the theory of social embeddedness and the theory of social capital, have renewed the analysis of organizational dynamics and more especially of individual action, intraorganizational cooperation, and interorganizational relationships (Baret et al. 2006). Two complementary perspectives have emerged. On the one hand, Huault (1998) shows that it makes it possible to ground a theory of action by setting it in its relational context, thus relativizing the effects of the attributes specific to individuals. Network theory thus makes it possible to analyze not only individual action but also collective action. On the other hand, the network is seen as a mode of coordination of individual activities that is an alternative to the market and the hierarchy (Baret et al. 2006). It is thus a mode of organization and a mode of governance.

A third perspective completes this landscape. Actor-network theory – also known as the sociology of socio-technical networks – which is more centered on innovation, goes further into the question of cooperation. Bestriding sociology and theory of organizations, it aims to theorize the mechanisms of the production of cooperation, one successful form of which is the network

(Akrich et al. 2006). These authors make *translation* a key element of their analysis. They use this term to express the need to interrelate heterogeneous activities and favor understanding among actors.

So, in this disciplinary field, social network theory makes it possible to characterize not only individual action but also collective action. Thus, some research has examined the effects of social networks on the performance of work teams (Hansen 1999), or the effects of “board interlocks” on corporate strategies (e.g., Gulati and Westphal 1999; Del Vecchio 2010). The network may be regarded instrumentally as a means of access to resources useful to action. It is also analyzed through its influence on the practices and tools of management (Lecoutre and Lièvre 2009). Finally, it is treated as an organizational model facilitating coordination among individuals or groups of individuals and organizations.

At last, the network is a mode of coordination alternative to the hierarchy, the market, and the contract, enabling flexible coordination of the resources of individuals and organizations, and in particular of knowledge resources. Social networks and the capital social they accumulate constitute a collective good for organizations: They reduce coordination costs and favor collective action based on shared values (Baret et al. 2006).

Social Network as a Theory of Social Embeddedness and as a Means of Securing Exchanges

Economics is no doubt the area in which network theory is least developed. However, as a means of coping with uncertainty, it has begun to be recognized. As Williamson (1975) observed, economic agents’ efforts to reduce risk in situations of uncertainty induce transaction costs. More generally, the means used to reduce uncertainty come up against various limits – the difficulty of accessing information on products or partners, the incompleteness of contracts, and the risk of opportunist behavior by one of the parties. In such situations, the social embedding of a transaction and the interdependence of social

and economic ties represent an efficient mechanism for economic coordination and offset the deficiencies of the market. Hence, it is the informational dimension of social networks that is privileged in this type of analysis (Ferrary 2010).

However, this notion of social embeddedness, derived from the works of Granovetter (2005) and the contributions of economic sociology, is not reduced to the informational dimension alone (Ferrary 2010). It makes insertion in networks a social capital that is regarded as a resource for individuals. Social embeddedness also modifies the mechanisms of social regulation that influence the behavior of economic agents and their individual decision making.

From another standpoint, in the construction of the social bond and the dynamics of networks in the writings of economists, they are often regarded as the result of the utilitarian behavior of individuals who maximize their utility by involving themselves in networks. This assumes intentionality on the part of individuals in their membership of networks, which leaves little place for other, e.g., more altruistic, behaviors.

Finally, Aoki (2010) refines the economists' distinction between social capital and social networks, considering that the notion of social capital relates primarily to individual strategies whereas social networks refer to the behaviors of individuals and result from an overall equilibrium associated with specific organizational models. In doing so, he gives the notion of the social network a more organizational dimension than that of the – more individual – social capital.

Characterizing Social Networks: Indicators and Methods

Different authors characterize networks according to different criteria, relating to their size, their density, the strength of the ties, their frequency, intensity, diversity, or multiplexity (a relationship is multiplex if it serves for several sorts of exchanges at once, as defined by Degenne and Forsé (1994)), their completeness or, on the contrary, the more personal character of networks, or the places that certain individuals or

collective actors occupy in the network (more or less central), and they specify the nature of the relations among individuals and organizations (proximity, trust, reciprocity, etc.). One of the difficulties encountered by these approaches is that of defining the frontiers of the network that is observed: Is it a personal network (of friends), is it complete (in the sense of a finite network such as a work team, etc.), is it stable (having a certain permanence, etc.), is it open (with the introduction of a principle of saturation, i.e., a situation in which supplementary observation does not modify the social structure being studied)? Another difficulty lies in taking account of its dynamic evolution – how does one grasp its changes over time? And what about learning effects?

Social network analysis is also based on the study of the relations among individuals and their regularities. It is thus possible to identify subgroups of individuals and their relationships with the network as a whole. This type of procedure relies on specific models and methods and on use of mathematical tools borrowed from the theory of graphs and linear algebra.

The methods of networks analysis may be inductive. Networks are then described in order to analyze a relational structure with the aid of a graphical representation (a sociogram) representing the ties among the actors. A good knowledge of the terrain of observation is required (Lazega 1998). Some authors adopt narrative approaches, thus exhibiting the activated relationships identifying the relational chains (Grossetti and Barthe 2008). They can also be deductive. In this case, membership of a network is treated either as an explanatory variable or as a variable to be explained.

To categorize research on social networks in the field of management, Chauvet and Chollet (2010) propose two levels of characterization of networks. These two levels in themselves constitute a template for reading networks. They distinguish the units of analysis and the level of analysis. The units of analysis, i.e., the actors who represent the nodes in the social network studied, may be either individuals, or groups of individuals, or organizations. As regards the level

of analysis of the effects of the network, it may either concern the benefits that the actor derives from the network or may privilege the effects of the network as a whole, observing how it is regulated or what its contributions are for the group, in a more collective perspective.

On the basis of this template, they bring to light the areas in which the contribution of network analysis to questions of management has been most significant: careers and professional development, management of innovation, corporate governance, entrepreneurship, organizational change, and team management.

Social Network and Social Capital: The Predominance of Analysis in Terms of Resources

Numerous studies use simultaneously the terms *network* and *social capital*. The proximity between social networks and social capital is expressed in the very definition of social capital in the sense in which it is used by Coleman (1990) as made up of relationships among individuals, social networks and norms of reciprocity, and the relationship of trust. It is also found in the emphasis on action found in the works of management researchers inasmuch as they regard the network as an alternative to hierarchy and the market (Baret et al. 2006). Finally, it is based on the fact that social capital helps to reduce the costs of cooperation. Bidart (2008: 44) for her part considers that “the notion of social capital... refers to the modalities of access to and use of the resources contained in social networks.”

Generally, and especially in management science, authors consider that the social network constitutes a social capital for the individual. Thus, Mercklé (2004) and Baret et al. (2006) show how Burt (1992), in formulating his theory of structural holes (gaps between two nonredundant contacts), illustrates the ways in which the structure of a social network offers competitive advantages to social actors. Thus, the less the actors have redundant relations, i.e., the less the actors know one another, the more each can hope to derive from his network of resources. In this sense, social capital does not only depend on the number of contacts or the

frequency of relations between the actors, but also on the non-redundancy of the relations. However, when allowance is made for power within the network, this tends to reduce the importance of the structural holes in favor of the actor’s more or less central or peripheral position within the network. Consideration of informal relations also occupies an increasing place in the analysis of networks and social capital (Lazega 2006).

Social Network and Entrepreneurship: Interpersonal Networks and Firm Networks

Numerous studies have noted the role of social networks in the success of the entrepreneurial process (Hoang and Antoncic 2003). They emphasize the importance of the entrepreneur’s personal connections in the success of her entrepreneurship. Personal relations as social capital for the entrepreneur is a decisive resource in entrepreneurial dynamics. The density of the enterprise creator’s network does not suffice for an understanding of the effects of the network. Two complementary elements have to be taken into account. On the one hand, there are collective dynamics which may be present from the outset in the entrepreneurial project. Thus, some authors use the term *embedded individual* and point out the collective dimension of entrepreneurship (Chabaud and Condor 2006). Others start out from the nature of the relations, in particular trust, to respond to the difficulty of accessing key resources (e.g., financing). Finally, access to resources (or competences) is a key element for the entrepreneurial team.

From another standpoint, firm networks are a characteristic feature of the reconfiguration of large companies, but also of smaller ones, helping to articulate entrepreneurial strategies with managerial strategies. The aim is the pursuit of interdependence to achieve greater efficiencies for the networked organizations, while maintaining a degree of autonomy. In this sense, the question of firm networks is not limited to large companies but extends to all companies.

Finally, the organizations supporting activity creation endeavor to integrate company creators within these same social networks. They are the

source of the development of the social capital that is essential in nurturing an entrepreneurial activity.

Interorganizational Networks

Networks are both interindividual and interorganizational. This second dimension will now be developed more specifically.

Interorganizational Networks, Resources, and Territories

Interorganizational networks are generally mobilized to explain the factors that lead firms to establish themselves alongside one another and to develop cooperation strategies (clusters, industrial districts, “poles of competitiveness,” etc.) conducive to their development. More broadly, network theory makes it possible to understand alliances and cooperation among organizations. It leads one to privilege observation of the types of resources that circulate between firms.

These analyses in terms of networks are situated in a critical perspective relative to the arguments traditionally invoked in terms of price effects to justify economies of agglomeration. They are also based on consideration of Marshallian externalities resulting from interfirm relations. They make it possible on the one hand to analyze the spatial strategies of companies, and on the other to characterize modes of cooperation among actors and among firms that are neither of the commercial relations type, nor hierarchical, nor contractual. Networks develop in particular when contractual relationships are difficult and it is necessary to avoid opportunist behaviors and reduce organization costs.

These interorganizational networks have particular links with the territory in the context of territorial networks or globalized networks (Boschet and Rambonilaza 2010). These territorial networks are generally analyzed in relation to the local productive systems and their configuration in terms of industrial fabric, factors of attraction, and specific resources. The analyses show that cooperation among organizations is strengthened by the development of informal ties that

reduce transaction costs. The different types of localized productive systems are identified through a characterization of interfirm ties and ties with the network leader (Carluer 2005) and depend to a large extent on their anchoring in the territory.

These interorganizational networks are also involved in processes of embedding (in the sense of increased interdependence among different social forms) to mobilize resources and of decoupling (in the sense of the process of autonomization of one form relative to another) to give strength to a collective actor (Grossetti and Barthe 2008).

Finally, these social networks help to facilitate and legitimize innovative processes, as soon as they are contextualized and able to develop functions of mediation (Grossetti and Barthe 2008) and translation, to make the innovations introduced by entrepreneurs intelligible to others (Akrich et al. 2006).

Interorganizational Networks and Network Firms

The theory of network firms has been developed since the 1990s within an analysis of cooperation among firms that makes it possible to move beyond the dichotomy put forward by Coase between the firm and the market. A network firm can be defined as a single productive organization among legally independent firms articulated by a focal firm. It characterizes an oblique economic integration (Baudry 2003), meaning a process of product design between clients and suppliers, without capital integration and even without real material assets. A network firm develops to access resources and create new resources.

This conception of the network firm feeds into the debate on a third way between the market and the hierarchy, extending the analysis of a hybrid institutional form put forward by Williamson (1985), and strengthens analyses in terms of cooperation.

Interorganizational Networks and Networked Governance

In the approaches that bear on interorganizational networks, public policy networks are regarded as

an alternative form of governance through which resources can be allocated, control exercised, and actors coordinated in other ways than through the mechanism of the market, characterized by competition, or the hierarchy, where bureaucracy often has the upper hand (Rhodes 1996). These studies have developed in a context of a questioning of the modalities of public intervention, decentralization of competences, dissemination of the principles of New Public Management, and opening up to a plurality of public and private actors put into competition in order to improve the efficiency of public policies.

A public policy network is defined as “the result of more or less stable and non-hierarchic cooperation among organizations that exchange resources and may share norms and interests” (Le Galès and Thatcher 1995). These networks are thus constituted by a complex set of self-organizing public and private organizations which continuously interact in the framework of relations among its members based on trust, reciprocity, and mutual interdependence (Larson 1992; Rhodes 1996: 659).

As Enjolras (2008) underlines, from the standpoint of governance, the concept of the public policy network designates a plurality of concrete phenomena in which both public and private actors cooperate with a view to economic, social, or public policy ends. More precisely, he characterizes a regime of governance in terms of three constituent elements, namely, the actors involved and their characteristics; the public policy instruments used to satisfy the public interest; and the institutional modalities of coordination and interaction among actors in a public policy network (Enjolras 2008).

Conclusion and Future Directions

As has become apparent, network theory constitutes a mode of coordination beyond the market, the hierarchy, and the contract. It is situated at an intermediate level between the micro and the macro and makes it possible to avoid both the risks of over-socialization (social membership is overdeterminant) and under-socialization (individuals are regarded as unrelated atoms)

(Forsé 2008) of the analysis of social and economic transformations. It facilitates a better analysis of the current transformations, as they affect either individuals or organizations, and their contextualization. It is particularly pertinent for an understanding of the strategies of firms and entrepreneurs, and in particular their anchorage in local territories.

However, as Mercklé (2004) pointed out few years ago, even today, social network theory gives rise to more modeling and deductive works than empirical and interpretative works. From this point of view, it is clear that an opposition still exists between interpretivist approaches on the one hand and positivist or causal approaches on the other.

The transversality of network analyses is an unavoidable element of research in various disciplines and in the renewal of debates. But these analyses must integrate more complex dimensions, notably that of understanding how to act on networks (Chauvet and Chollet 2010), without becoming trapped in a utilitarian or instrumentalized approach to social networks. The social embedding of economic relations and the resulting articulation between economic exchanges and social exchanges indeed opens up particularly relevant perspectives for analyzing the current transformations of individual behaviors, organizations, or territories.

Cross-References

- ▶ [Actor-Network-Theory and Creativity Research](#)
- ▶ [Clusters, Networks, and Entrepreneurship](#)
- ▶ [Network and Entrepreneurship](#)
- ▶ [Networking Entrepreneurship](#)
- ▶ [Proximity Relationships and Entrepreneurship](#)
- ▶ [Social Capital of the Entrepreneur](#)

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Social Psychology of Creativity

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Synonyms

Creativity and environment; Social psychology of innovation

Introduction

Implicit in much of the early theorizing and research on creativity was a focus on the internal determinants of creativity, to the exclusion of external factors such as the environmental circumstances that foster idea generation and creative behavior. In the mid-1970s, this gap in the creativity literature began to be recognized by a small group of social psychologists who came to concentrate their interest on the contexts in which creative ideas are most often generated or seemingly intractable problems are solved. This change of focus eventually led to the study of what has come to be termed “the social psychology of creativity.” Explorations of the environmental factors conducive to (or detrimental to) creative performance were soon broadened to consider not only models of environmental and social contextual influences on the individual but also models of how creativity actually arises through social interaction and collaboration in teams or groups, as well as models of how creative ideas and products can ripple through and eventually transform entire social communities. For the most part, these lines of inquiry were initially pursued fairly separately from one another. Recent interest in multidisciplinary and interdisciplinary approaches coupled with exciting advances in modeling and statistical analysis techniques now make it possible for these three areas of research to inform each other and provide new possibilities for better understanding the social dimension of creativity production and dissemination.

Environmental Influences on Individuals' Creativity

Pioneers in the study of the impact of environmental factors on creative performance were Lepper, Greene, and Nisbett who, in 1973, found that, for preschoolers, working for an expected “Good Player Award” significantly decreased their interest in and enjoyment of drawing with markers. When compared with an unexpected reward group and a no-reward group,

children who had made drawings in order to receive an award spent significantly less time using the markers during subsequent free play periods. Moreover, the globally assessed quality of the rewarded children’s drawings was judged to be significantly lower than that of the other design groups. What was truly astounding about these findings was that *all* of the young participants in this study were specifically selected because they were passionate about drawing with markers. Yet a simple, one-time offer of a certificate was enough to undermine their task interest as well as their performance.

Over the years, experimental paradigms have become increasingly complex and results increasingly nuanced. But the basic findings remain the same. There has been observed a consistent relation between the motivational orientation brought by an individual to an open-ended problem or task and the likelihood of creative performance on that task. And it is the environment that, in large part, has been found to determine that motivational orientation. As summarized in the Intrinsic Motivation Principle of Creativity, intrinsic motivation is conducive to creativity, while extrinsic motivation is almost always detrimental (Amabile 1996). Simply stated, the expectation of reward, as well as the imposition of a variety of other extrinsic environmental constraints including expected evaluation, competition, and time limits, has been demonstrated to negatively impact the intrinsic task motivation and creativity of persons of all ages (see Amabile 1996; Hennessey 2003b).

Not only is intrinsic task motivation necessary for creative performance, it has also been shown to be an extremely delicate and fleeting state. Researchers have found it all too easy to undermine intrinsic motivation and creativity with the promise of a reward or an expected evaluation. What has not been easy is understanding why these extrinsic constraints have such a negative effect. Early theorists suggested a “discounting” or “overjustification” process. In situations where actions are overjustified, when both a plausible internal and an external cause of behavior are present, most individuals will tend to *discount* the internal cause in favor of the external

explanation. The assumption will be made that task engagement or attempts to solve a problem have been driven by extrinsic rather than intrinsic reasons (see Amabile 1996; Hennessey 2003b). And without high levels of intrinsic motivation, creative performance is extremely unlikely.

Why is intrinsic motivation so necessary for creative performance? Some have proposed that one of the most important functions of task motivation is the control of attention. Studies of a phenomenon termed optimal experience or “flow,” for example, point to a link between creative performance and a highly pleasurable state in which persons become so immersed in an activity or problem that they lose all sense of time and place. But when an extrinsic constraint is imposed on an individual’s behavior, a portion of the cognition, concentration, and energy that should be devoted to the task or problem requiring a creative solution is instead directed toward the impending reward, deadline, or evaluation. Amabile (1996) offers a maze metaphor that is helpful in illustrating this phenomenon. She suggests that an open-ended “creativity-type” task is like a maze. There is one starting point, but there are a variety of exit points and many different paths to those exits. Most importantly, some of those exits, those solutions, are much more “elegant” or creative than others. In the face of an expected reward or evaluation, the goal is to “play it safe” and get in and out of the maze as quickly as possible. In order for a creative idea or solution to be generated, however, it is essential to become immersed in the maze itself. The artist, musician, scientist, or writer must be willing to experiment with alternative pathways and risk hitting a “dead end.”

At the core of many conceptualizations of the intrinsically motivated state is the issue of control. Most contemporary theoretical models developed to explain the undermining effects of extrinsic constraints rest on the assumption that persons of all ages and backgrounds are driven by an innate need to preserve a sense of autonomy and self-determination – to feel an internal locus of control and to act as “origins” of their own behavior. This formulation has been applied equally successfully to classroom, laboratory,

and workplace situations (see Amabile 1996; Hennessey 2003b) and has also helped to explain a small body of seemingly contradictory findings offered by investigators trained in the behaviorist tradition.

These researchers present the strongly contrasting view that creativity can be *easily increased* by reward and that the detrimental effects of extrinsic constraints occur only under limited conditions that can be easily avoided. A debate over these issues first surfaced in the mid-1990s, prompting the publication of a series of heated commentaries and critiques. At the core of the disagreement were important differences in the definitions of creativity driving investigations, the algorithmic or heuristic nature of the experimental tasks employed, and the instructions given to study participants. Generally speaking, this controversy has been healthy for the field, generating a number of new avenues of study including investigations into so-called “immunization” effects and a sort of motivational synergy that combines elements of intrinsic and extrinsic orientations (see Amabile 1996; Hennessey 2003b).

In sum, a complex array of factors contributes to an intrinsically motivated orientation and creativity of performance. When confronted with an open-ended task or problem, the individual feels curious and stimulated. Task engagement feels free of strong external control, and as progress is made, there emerge feelings of competence, mastery, and self-efficacy. Importantly, each of these hallmarks of intrinsic motivation focuses on an internal phenomenological state: Intrinsic motivation is assumed to be the result of an essentially individualized process. Although some theorists talk of supportive motivational milieus, corporate climate, or the complex social systems found in large organizations, the imposition of a deadline or the promise (and eventual receipt) of a reward or evaluation is seen as primarily a mechanistic process. Yet creativity is essentially a social phenomenon. Domain and technical skills are most often taught and acquired in a group setting. Creativity skills are modeled by others, and the generation of creative ideas and the process of bringing those ideas to

fruition frequently come as a result of group efforts.

Many years ago, social psychologists began to move beyond a narrow consideration of the individual doing the creating toward an appreciation of the strong impact that a variety of environmental factors can have on motivation and creativity of performance. Others began to ask whether teachers or managers who impose environmental constraints or peers in a classroom or the workplace might themselves shape an individual's ideas about creativity, their motivational orientation, and their creativity of performance. It is these kinds of research questions that add a truly social component to the social psychology of creativity (see Hennessey 2003a). The sections that follow outline two especially important areas of inquiry: one with a focus on teams and the other with an emphasis on the ways in which creative ideas and products are introduced into and influence the broader social community or society.

Creativity in Teams and Groups

In recent years, researchers have moved beyond viewing teams as part of the broader organizational context (Amabile 1996) and have begun to focus more directly on team-level factors that influence creative problem solving and innovation. This shift has occurred for multiple reasons (Reiter-Palmon et al. 2012; Paulus et al. 2012). First, teams now produce more knowledge than individuals. The emergence of the knowledge economy has changed the nature of innovative work such that problems tend to be more complex and require more diverse skills than individuals are likely to possess. With this shift toward groups as the dominant form of knowledge production, new challenges arise. Teams must learn to harness the value of diverse team member skill sets, while managing conflict and other social processes associated with increased diversity. Furthermore, scholars increasingly acknowledge that team creativity is emergent and indeed represents a different phenomenon than individual or organization-level creativity.

Researchers have linked a number of team-level factors to enhanced team creativity. These factors, which are generally thought to interact to influence outcomes, can be divided into three categories: team characteristics, social processes, and cognitive processes (for a review, see Reiter-Palmon et al. 2012). The relations among these areas are multilevel and complex. For example, one process in a team interacts with and can affect other social processes, making it difficult to discern moderating factors and relative importance.

Team characteristics are often studied in the context of the effects of team member diversity or size on creative outcomes. Researchers have shown that the relation between team composition and creativity is more complex than initially thought (Reiter-Palmon et al. 2012). Demographic diversity appears to have no discernable influence on outcomes; however, functional diversity, also termed skill-related diversity, has often been positively linked to enhanced team creativity. Other sources of team member diversity, such as cognitive style, creative ability, and personality, have also been shown to affect outcomes.

Several social process variables have been identified as being linked to improved creative outcomes, including adaptation, coordination, communication and information sharing, trust, psychological safety, support, conflict, cohesion, evaluation, group stability, virtual teams, and leadership (for full review, see Reiter-Palmon et al. 2012 and Paulus et al. 2012).

Effective coordination and communication are especially important for projects that are complex, ambiguous, or require adaptation (e.g., creative problem-solving projects). Researchers tend to agree that open and constructive communication leads to better overall outcomes. Team psychological safety, a construct linked to interpersonal trust, refers to a shared belief that the team is capable and that individuals within the group will be supported when they take interpersonal or project-based risks. Team-based research coming from a variety of fields has linked these supportive behaviors to team effectiveness and adaptation, and this finding likely applies in the context of creativity and

innovation, although further research is needed in this area.

The role of team conflict in influencing creativity is complex. Researchers tend to distinguish between task and relationship conflict, although at present, there is a lack sufficient evidence to delineate clear relations between these two constructs and their individual or collective influence on outcomes. Some scholars suggest a curvilinear relation between conflict and creativity, similar to the relation that has been found between diversity and creativity, although again, further research is needed.

Team cohesion, or the connectedness of team members and the view that the group is working as a collective, has been related to improved outcomes, although the relation is not straightforward. Cohesion can also serve to suppress constructive conflict, leading to “group think,” which has been shown to hamper creativity.

Team-level cognitive processes leading to creativity have received comparatively less attention in the literature than have individual cognitive processes, team characteristics, and social processes, although this trend is changing (Reiter-Palmon et al. 2012). The most studied cognitive process is idea generation. This factor has often been equated with creativity, although, importantly, it is only one of several cognitive processes involved in team creativity. Research remains inconclusive as to the benefits of group, as opposed to individual, brainstorming.

Other team cognitive processes tied to creative production include additional stages of the creative problem-solving process (problem definition, information gathering, idea evaluation, idea testing or prototyping, implementation planning, execution, dissemination, and evaluation), as well as shared mental models, social cognition, team reflexivity (Reiter-Palmon et al. 2012), and task focus (Paulus et al. 2012). As with many of the aforementioned factors, more work is needed to better understand team cognitive processes, how they relate to one another, and the ways in which cognitive processes interact with team social processes and team characteristics.

Although research on team-level creativity has increased dramatically in recent years, there remain a number of methodological issues. There is a need for more objective assessments of creative outcomes at the team level. Also needed are more studies that move beyond laboratory simulations and college student populations that can be generalized to broader educational, organizational, and cultural contexts (Paulus et al. 2012). Additional investigations of this type will be particularly important as scholars endeavor to improve our understanding of how individual factors interact at the team-level, and with team-level and organizational-level factors, to influence creativity.

Creativity as a Social-Psychological Force Within and Across Groups

Expanding the investigative lens even further, some researchers have focused their attention on how creative ideas or products introduced into a social context can change the way members of a community think or behave. This approach to the study of creativity highlights how the person-context interaction is mutually influential and bidirectional. Not only can social-environmental factors or features of the work teams in which people find themselves impact creative behavior, but the creative behavior and the ideas and products generated can be a cause of social-psychological phenomena, such as opinion or behavior change, sociocultural development of groups over time, and shifts in power and knowledge among groups (Moran 2010).

Most social psychology paradigms emphasize the ways in which individuals are influenced by and come into alignment with a social context as they conform to normative influences, such as peer pressure, or informational influences, such as education. As more people believe and behave in the same way, they reinforce each other's sense that they are behaving correctly. They come to contribute to the group, be it a family, work team, organization, industry or field, social community, or even an entire society, in a way that maintains the current state of that group.

When a person, team, or organization introduces an original idea or product, variation is introduced into the larger group's ways of thinking, or its culture. Over time, some group members – or others outside the group – may deem the novelty useful. As the idea or product influences more people, it moves from “little-c” personal creativity, to “middle-c” shared creativity, and potentially to “big-C” historically transformative creativity (see Moran 2010).

Creativity can be a social-psychological force for an individual's self-expression within a group and/or a vehicle for improvement of that group as a whole (Moran 2010). Personal creativity exemplifies how individuals within a group *express* their idiosyncratic understanding of or perspective on some topic. The group provides a forum, a tool, for individuals to present variation or difference. Historical creativity, such as the creative breakthroughs of paradigm shifters like Einstein, or social transformations, such as those brought on by the civil rights movement, exemplify how the group as a whole can be *improved*. Individual contributions are tools for advancement of the group into a stronger position within the wider context. Creative ideas, products, and solutions are only creative temporarily – as they are being introduced and judged. Over time, if accepted, what was once deemed creative becomes the norm or standard for later generations.

The process by which a novel product is launched into and accepted by a community, field, or market is termed “innovation diffusion” (Rogers 1983). Because of conservative psychological biases and inertia characterizing most social groups (i.e., people tend to like things the way they are unless a novelty can be shown to be greatly beneficial over and above the perceived costs or risks), it is often difficult for new ideas or products to be adopted (Rogers 1983). Adoption stems from individuals sharing information, mimicking others' behavior, learning vicariously based on others' experiences with the innovation, and social influence exerted by powerful opinion leaders (Peres et al. 2010).

Early diffusion models considered group members to be essentially homogeneous.

More recently, researchers have become increasingly concerned with the ways in which variability among characteristics of users, products, relationships, and social structures influence the adoption rates of innovations (Peres et al. 2010). Studies of the impact of user characteristics address openness to experience, risk-taking, price sensitivity, and needs. Studies of product characteristics focus on how useful, compatible, understandable, and versatile the product is for users' needs (Rogers 1983). Investigations of interpersonal variables include studies of how individuals infer the social consequences of adoption and the changing assessments of trust and reputation stemming from media (Peres et al. 2010). Finally, social-structural analyses show that weaker ties across diverse groups, and marginal players at groups' boundaries, are both important for creativity's social influence (Peres et al. 2010).

A logistic model (S-curve) depicts the stages after product introduction in which different types of people adopt (Rogers 1983). A few are “innovators,” curious people who try new products even before they are reviewed or critiqued by professionals. About 10–25% of the community, “early adopters,” are opinion leaders with a wide social network to generate “buzz.” As more people use the idea or product, the product can become more valuable. Over time, this process termed a “network externality” (Peres et al. 2010) reduces the uncertainty and risk so that the “majority” become users. Risk-averse and strongly price-sensitive individuals, “laggards,” wait for price reductions, but they may be forced to adopt the innovation because it has become the norm (Rogers 1983). For example, once a critical mass of people bought telephones or joined Facebook, many individuals felt compelled to follow suit in order to stay in communication with friends.

Much of the scholarship on this process has been done outside of social psychology – incorporating work coming from other areas of psychology as well as related disciplines including sociology, economics, business/organizational, and engineering. Contributions coming from the field of education through knowledge acquisition studies and the organizational literature on

innovation and diffusion of technology have been particularly influential. This multidisciplinary perspective underscores the importance of individual contributions and how they can affect larger social entities. The spread of creative ideas is a social-psychological construct because it describes how innovations, transmitted through social interactions and influences, impact the preferences, opinions, attitudes, and behaviors of persons both individually and collectively.

Conclusion and Future Directions

Clearly, the expansion of research questions, empirical methodologies, and investigative focuses outlined in this entry has contributed significantly to an understanding of the social psychology of creativity. Yet there remains much work to be done. Like their colleagues before them, contemporary researchers have a long way to go before they fully understand the complex interplay between social-environmental factors, the generation of creative ideas or problem solutions, and the diffusion of those ideas both within and across teams and social communities and into broader societal contexts. Only by using multiple lenses simultaneously, cutting across levels, and incorporating the perspectives of social, organizational, educational, and developmental theorists will investigators be able to reach this goal. Recent work also underscores the importance of infusing a consideration of the intersection between cultural and social influences into any new models. What is needed now is an all-encompassing systems approach to the social psychology of creativity, a theory that will tie together and consolidate the growing diversity of perspectives found in the literature – from the interaction between a single individual and the immediate environment to the impact of overarching cultural norms on the creative process.

Cross-References

- ▶ [Business Climate and Entrepreneurialism](#)
- ▶ [Business Creativity](#)
- ▶ [Creative Behavior](#)
- ▶ [Creative Problem Solving](#)

- ▶ [Creativity and Innovation: What Is the Difference?](#)
- ▶ [Freedom and Constraints in Creativity](#)
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- ▶ [Measurement of Creativity](#)
- ▶ [Psychology of Creativity](#)
- ▶ [Social Innovation](#)

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Socialization of Entrepreneur

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Socialized Entrepreneur, Theories

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Synonyms

[Business climate and entrepreneurship](#); [Entrepreneurship](#); [Family and entrepreneurship](#); [Socialization of entrepreneur](#)

The beginning of the twentieth century is marked by growth in the size of firms, by the development of the division of work within the enterprise and between enterprises, and by the separation between property and the generation of capital, that is, managerial capital. This second period saw important progress in the socialization of the economy. The socialized entrepreneur (Boutillier and Uzunidis, 1995) devoted himself to the development of managerial capital, that is, an economy dominated by large firms and where

the role of the State is preponderant both in its own functions as entrepreneur (predominantly during the period 1950–1970) and in the reduction of uncertainties (since the 1980s). In spite of the rapidly growing concentration of economic activity, entrepreneurial initiatives are far from having disappeared – contrary to the fears expressed by Schumpeter. In order to escape from the feudal economy, it was necessary to invent a new economic logic (whence, the heroic entrepreneur). In managerial capitalism dominated by powerful groups, the rules of competition are not fixed. Here, the entrepreneur assumes more than ever his part of the risk in an economic context always dominated by uncertainty – even though managerial capital has generally been considered by various economists as a situation of relative stability in terms of market positioning (thanks to its oligopolistic structure) and consequently one of comparatively weak uncertainties.

Just as it has been a question of returning to the sources, the founding economists, their neoclassical successors, whose work marked the course of the twentieth century, called back into question the hypothesis of market transparency and thereby rehabilitated the entrepreneur, using as their starting point the founding analysis of Carl Menger. The function of the entrepreneur is to channel the uncertainty inherent in the working of the market. This leads to the detection or creation of market opportunities. Hayek, Mises, Kirzner, Knight, Casson, and Audretsch describe a socialized entrepreneur whose activity occupies the ground between the strategies of large firms and aspects of public policy (whether it is a question of supporting the activities of large groups or seeking to favorize the creation of new firms to fight against unemployment or to encourage innovation).

Uncertainty, Risk, and the Entrepreneurial Function

Friedrich Von Hayek: Ignorance and Success
For Friedrich A. von Hayek (1899–1992) (2011), who declared himself a supporter of the arguments of Menger, the entrepreneur does not take decisions within a transparent economic environment.

On the contrary, since the knowledge capable of being brought to bear consciously by any one individual is only a small part of the knowledge that can contribute at any one moment to the success of his actions. Hayek explains in substance that the sum total of the knowledge of all individuals exists nowhere in an integrated manner. Moreover, to the extent that knowledge progresses, new zones of ignorance are discovered. Briefly, economic actors take decisions in a context of uncertainty (and not of transparency – putting into question one of the hypotheses of the competitive equilibrium model). It is on account of this fundamental reason that the market economy functions. F. von Hayek is, besides, highly critical of those he calls intellectuals: an understanding of business, he explains, and explanations of the determination of relative values in terms of marginal utility are crucial for a comprehension of the order on which the subsistence of millions of human lives depends. And such questions ought to be familiar to any cultivated person. Such comprehension has nevertheless been counteracted by the general mistrust with which intellectuals tend to consider the subject as a whole. For everything that has been brought up to date by marginalist theory – that is to say that the task of each individual should be to contribute, on the basis of his knowledge and his personal capacity, to satisfying the needs of the community by bringing to bear his *personally chosen* contribution – is foreign at one and the same time to the primitive spirit, to the reigning constructivism, and to explicit socialism.

Then he adds that the objections of the *fine spirits* (underlined by Hayek) of our time – the intellectuals – do not differ profoundly from the objections of members of primitive groups. What intellectuals imbued with constructivist prejudices consider as being the most reprehensible in the structure of the market, the money, and the financial institutions is that the producers, distributors, and financiers are not preoccupied with the concrete needs of people but with the abstract calculation of costs and profits. They forget in that – or they have not understood – what is at the heart of the arguments we have just set out.

The quest for profit is precisely what makes possible the more efficient use of resources.

It permits the most productive utilization of the diversity of potential contributions from other firms... The entrepreneur, if he intends to supply the means of creating still more means that may themselves serve others and particularly if he aims to serve a multiplicity of final objectives, must within the context of his activities experiment beyond currently known practices and targets. Prices and profits represent everything that most producers require so as to be able to serve effectively the needs of people they do not know. They constitute the instruments of research – in the same way as the soldier or the hunter, the mariner or the aircraft pilot, radar, or a pair of twins. The processes of the market furnish to most people the material and information resources they require to obtain *what they wish*.

Hayek reproaches intellectuals for understanding nothing, either of the economy, or of the entrepreneur, whether it is through stupidity or ignorance. As he explains it in substance, merchants have since the dawn of humanity been the motors of civilization and of progress. He insists particularly on this subject by underlining that commerce antedates in the history of mankind either the invention of agriculture or of the State. Governments have for the most part hindered whatever might promote the development of long-distance business, while business people have, on the contrary, contributed to keeping officialdom informed. Those who have offered the greatest independence and the greatest security to the business world have benefitted from the growth of information and of populations which have resulted. Those States which have aided business people to go about their activities have shared handsomely in the resultant profits.

Information is the nerve center of business; economic agents act in ignorance of the decisions of other economic agents. Hayek begins chapter 2 of “The Constitution of Freedom” (Hayek, 1994, p. 23) by the Socratic maxim: recognizing our ignorance is the beginning of wisdom. The first condition to understand society, he explains, is to take conscience of the ineluctable ignorance by men of much of what can help them to achieve their ends. The greater part of the advantages of life as part of society... rest on the fact that the

individual benefits from more knowledge than he is aware of. It could be said that civilization begins when the individual, in pursuit of his aims, is able to make use of a greater sum of knowledge than he has been able to acquire himself and when he can extend beyond the boundaries of his own ignorance by making use of knowledge which he does not himself possess. The main idea here is that the individual can, paradoxically, succeed despite himself, of at least without possessing all the information necessary for the success of his business.

Hayek insists, too, on a phenomenon which we call "socialization," although he calls it "civilization." He writes that the spirit of man is the product of civilization in which he has grown up and explains that we must take into account that the knowledge that an individual spirit consciously manipulates is only a small part of the knowledge that at a given moment contributes to the success of his actions.

Ludwig Von Mises: The Entrepreneur and the Law of the Market

Mises signs up, like Hayek, to the Menger problematic. For Mises (1881–1973), entrepreneurs are the motive force of the market. He defines them as a sort of intermediary acting on the marketplace. This premise leads him to accentuate the effects of competition. Entrepreneurs are "those people who seek to obtain a profit by taking advantage of differences in prices." Faster in their comprehension and further-sighted than other men, they look around themselves for potential sources of profit. They buy where and when they consider prices are too low, and they sell where and when they consider prices have risen too high. They address themselves to the owners of production factors, and their competition leads to rises in the price of these factors until they reach the limit which corresponds to their anticipation of the price of future products. They address themselves as well to consumers, and the competition they bring to bear forces down the price of consumer goods to the point where the entire offer becomes the motive force of the market in the same way that it has become the motive force of production. The entrepreneur is a singular economic agent

because each individual combines several functions, for example, consumer and worker. Moreover, a single individual can combine the functions of entrepreneur, owner, capitalist, and worker. But, what is the specific function of the entrepreneur? The specific function of the entrepreneur consists in determining how the factors of production shall be utilized. The entrepreneur is the man who dedicates them to specific functions. His objective is purely egotistical, he is there to enrich himself, but he does not dispose of a complete freedom of action since he cannot escape from the law of the market. Consumers have an important role since the entrepreneur "can only succeed by providing the best possible service to the consumer." His profit depends on the approval of his behavior stemming from the consumer. Mises also speaks of consumers as captains of the economy. The entrepreneur must obey them.

Like Schumpeter, and a good many other economists before him, the entrepreneur is not embodied in a single individual. "The economy, in speaking of entrepreneurs, has in view not necessarily men, but a particular function." In defining this function, the objective of the economist is not to define a particular group or class of men, but the entrepreneurial function is unique to each action. Seeking to incarnate the entrepreneur within an imaginary personality is to have recourse to a "methodological subterfuge." Mises underlines that every action is integrated into the flux of time and therefore involves a speculation. Capitalists, owners, and workers are speculators by necessity. It is the same with the consumer who looks to provide for his anticipated needs. Thus, all the world can be an entrepreneur (which implicitly signifies that the state of the entrepreneur is not permanent) and above all if the entrepreneur gives himself over to arbitrage on prices, which is not a behavior specific to the stated function because all economic actors are led to speculate, since "each action is integrated into the flux of time and therefore implies a speculation."

Mises pursues his process of constructing the theory of the entrepreneur in seeking to pose a question relating to a series of generally accepted ideas. Thus, the entrepreneur may not

actually be a business owner because he has to borrow the funds he needs so as to have the use of them. What about profit in such a case? "If he succeeds, the profits are his, but if he fails, the loss falls on the capitalists who have lent him the funds." From his own point of view, the capitalist who lends him the funds is also a speculator and an entrepreneur since he still runs the risk of losing his money. "There is nothing that resembles a perfectly safe investment." Anyone can be an entrepreneur and speculate. Speculation is not a domain reserved for the entrepreneur. Does that signify that the economy is composed exclusively of entrepreneurs and that everyone acts to maximize his capital or the fruits of his labor?

Israel Kirzner: Uncertainty and Profit

In the same line of thought, Kirzner (1930–) describes entrepreneurial activity as the discovery of profit opportunities that others have not discovered previously. There flows from this the concept of "entrepreneurial vigilance." In such conditions, the profit of the entrepreneur is the reward obtained partly by chance but also due to the ability of the entrepreneur to anticipate the way individuals will react to change. Kirzner refuses the issue of the maximization of profit. Or rather, the entrepreneur is not only a calculating agent, he is also an economic actor attentive to opportunities. The Kirznerian entrepreneur, in contrast to his Schumpeterian counterpart, creates nothing new, but is a discoverer of opportunities which exist already.

For Kirzner (1973), profit opportunities are born of imbalance rather than of equilibrium. The entrepreneur must be vigilant to detect and then to exploit the profit opportunities which may present themselves. The entrepreneur thus presents himself as the economic actor who exploits the ignorance of others and uncovers information to his advantage. He thus puts in evidence the "entrepreneurial vigilance" which is defined as a kind of particular capacity of entrepreneurs to acquire information in a spontaneous way. But evidently, according to Kirzner, we know that human beings do not operate in a world of perfect knowledge and it is that which leads us to underline the importance of the vigilance which certain

individuals can manifest with regard to new information. Kirzner underlines heavily that the entrepreneur has no place in a world of perfect information. Thus, in a world of perfect knowledge, that is to say one where opportunities for unexploited gains are excluded, such a decision-maker has simply nothing to do and has no field of action to exercise his decision-making powers. Kirzner calls fundamentally into question the model of pure and perfect competition, but equally the theory of Schumpeter. Schumpeter's theory differs from mine. The Schumpeterian entrepreneur acts so as to disturb a situation in balance. The action of his entrepreneur interrupts a continuously circulating flux. He is described as unleashing change and generating new opportunities.

Even though each new entrepreneurial innovation may lead finally to a new equilibrium, the entrepreneur is still presented as an unbalancing rather than a balancing force. For me, the changes that the entrepreneur triggers are turned more towards the hypothetical state of equilibrium; they are changes provoked in response to an existing scheme of things resulting from mistaken decisions, a scheme characterized by missed opportunities. The entrepreneur, according to Kirzner, leads us towards a mutual adjustment of these discordant elements in the market which resulted from previous ignorance of the market. My insistence on this difference between Schumpeter's analysis and my own underlines the crucial importance of the entrepreneurial spirit in the development of the market. A treatment such as that of Schumpeter, who identifies the entrepreneurial dynamic as an exogenous force disturbing an economy in a state of equilibrium (to finally reach another such state on account of "imitators"), risks giving the impression that, to reach a state of equilibrium, entrepreneurial acts are, in principle, not called for. Differently stated, such a representation risks nourishing the completely false idea that a state of equilibrium can be established without the intervention of some kind of social instrument which deploys and assembles dispersed items of information, together comprising the unique components of such a state.

Only entrepreneurial action can lead to real balance. According to Kirzner, the entrepreneur is not a source of innovation *ex nihilo* but he is constantly on the lookout for opportunities which already exist and are waiting to be noticed. In economic development as well, the entrepreneur must be considered as responding to opportunities rather than creating them, as in seizing occasions that may yield profits, rather than generating them. But, while the entrepreneur according to Schumpeterian theory is an exceptional being, who by his acts causes the economy to develop in response, as accepted by the Austrian school following the work of Menger, the entrepreneur is a man like others, who has known, or who knows, better than others how to detect profit opportunities. This capacity shows in a facility to perceive opportunities offered by the market. Thanks to this quality, the entrepreneur knows how to combine the factors of production, and in what quantities, and also how to find the people holding the information he needs in order to find the sources of profit. Kirzner calls into question in his own way the myth of the self-made man in showing implicitly that entrepreneurial success is not just the consequence of the intrinsic qualities of an individual, however exceptional he may be.

From another standpoint, in discovering the profit opportunities which had previously lain unknown, the entrepreneur introduces changes that create a new situation of uncertainty, but one from which other entrepreneurs may draw profits in discovering in their turn other previously ignored opportunities. Opportunities are born of imbalance, not of balance. The existence of imbalance signifies the existence of pockets of ignorance within the market structure. In the absence of such pockets of ignorance, there are no more investment opportunities and consequently nothing for the entrepreneur. One comes back to the conclusions of Walras.

Franck Knight: Unpredictable Risks

The profit received by the entrepreneur is for Frank Knight (1885–1962) a fair remuneration because it is the product of uncertainty and of

the risk taken. Uncertainty in fact occupies a large place in his analysis. The author opposes two types of society. The first is an imagined society, but he attempts to describe it as realistically as possible. This society is characterized by the absence of uncertainty. All the economic actors have available to them the same knowledge and the same information. This society changes radically with the introduction of uncertainty so as to constitute the second type of society. Two major problems flow from the introduction of uncertainty (Knight, 1965):

1. First of all, the entrepreneurs must forecast the needs of consumers; this task, along with the technological management and control of production, finds itself concentrated within one particular category of individuals: the entrepreneur.
2. Next, in this context of uncertainty, the work of conception focuses preponderantly on the two major blocks of production and organization. The entrepreneur and the hierarchical organization of the firm are the consequences of introducing uncertainty into a market economy. Add to that that in this context of uncertainty, the entrepreneur takes risks which, according to Knight, have no measure of probability by reason of the unpredictable character of market development. The profit is then the just remuneration.

Knight approaches the almost original definition of the entrepreneur, that of Cantillon, since the entrepreneur is only defined by virtue of his capacity to take risks.

The Entrepreneurial Behavior in the “Laissez-Faire” Economy

Marc Casson: The Family and the Socialization of the Entrepreneur

Mark Casson (1945–) prolongs the neoclassical analysis so as to make room for the entrepreneur by introducing noneconomic elements, first of all the family. The economic actors are thus encased within a particular social environment, before becoming economic actors ready to attack the market. This basis leads Casson to put forward

two elements of fundamental analysis to explain the entrepreneurial success which results: the family (creation of a network of relations to obtain finance and locate markets) and the mastery of information (also to find funds and markets). Casson defines the entrepreneur as someone specialized who takes reasoned decisions relative to the coordination of rare resources. Then he details the different parts of his definition (2003):

1. The entrepreneur is a person. He is an individual. He is not a team nor a committee, nor an organization . . . Only individuals are capable of taking decisions.
2. The entrepreneur is someone specialized; a specialist fulfills his function not only for his own account but also for the account of others.
3. He takes his decisions in well-reflected form; a well-reflected decision corresponds to the fact that a set of distinct individuals share the same objectives and, acting in the same context, can take opposite decisions. This results from their different perceptions of a given situation.
4. He coordinates rare resources, capital, and labor: such coordination can be defined as an advantageous reallocation of resources. An entrepreneur is therefore an agent of change. He seeks to improve the deployment of resources which are rare by virtue of the offer and of the demand.

This definition is valid, whatever the institutional framework under consideration. The entrepreneur is not a characteristic of the capitalist economy. The entrepreneur may even be the planner of a socialist economy, a priest, or a monarch in a traditional society. In reality, though, the function of the entrepreneur is closely identified with the privately owned firm in a market economy.

Entrepreneurial success is conditioned by information and by the family. Information includes profit opportunities. What are the exploitable markets available or to be created? The family constitutes a notable source of potential information. The knowledge contained within even his own family can be turned to

advantage. But success is limited by the extent of the family fortune and by the extent of competences available within the family. The entrepreneur is confronted with multiple barriers to entry:

1. The personal fortune of the entrepreneur is often insufficient; informal contacts with the family, friends, and business partners are important for amassing capital or contracts with financial intermediaries.
2. Collecting information is difficult; outside of the family, clubs and associations constitute the most important nonprofit institutions, thanks to which individuals can secure contacts and assemble the information necessary to the launch of their enterprise.
3. The educational and training level of the entrepreneur plans an important part: the qualifications obtained play a very important role if he is to pass beyond the constraints imposed by the absence of a personal fortune.

Casson sets out the qualities required to be an entrepreneur; nothing new since J.-B. Say is noteworthy: capacity for negotiation, capacity for organization, capacity for management, capacity for selling, and capacity for innovation. But what then are the reasons why an individual can turn into an entrepreneur?

1. The first reason invoked that one becomes an entrepreneur because there is no job vacant. In other terms, setting up one's own business can constitute the only way out of an unemployment situation, which is provoked, for example, by trade unions which have set a rate of pay too high to allow employers to recruit.
2. The individual can refuse to be placed under the control of a superior who may impose on him one task or another independently of his own aspirations.
3. The individual may only be seeking a part-time job, to earn some extra money, or may become an entrepreneur as a complement to a salaried activity, as a pastime.
4. The main reason that leads an individual to become an entrepreneur is that he will find thereby the autonomy he needs to exploit his talents.

Among these four arguments, the fourth is the only positive one. The first three reflect negative aspirations. The individual then acts in the quality of “employer of last resort” for himself, and there is little chance of succeeding for the following reasons:

1. An individual who considers that it is difficult to find employment in a competitive situation, or to preserve his employment once he has obtained it, will probably not have the personal qualities required to succeed in business.
2. An individual who cannot stand the idea of being employed will probably not be capable of employing other people, thus limiting very rapidly the growth prospects for his firm.
3. An individual who insists on working as he wishes will certainly not provide his customers with the quality of service they expect, which will limit the chances of survival of his firm.
4. One can equally well think that an entrepreneur without salaried experience will be seriously penalized. In order to succeed, it is advisable to start out as a salaried employee. People in such position can learn the business of their employer, before branching out on their own. They can put to good use the positive or negative experience acquired in their employer’s firm.

There exists consequently a very close link between the condition of the salaried employee and that of the entrepreneur, to the extent that the first can constitute a kind of springboard to becoming an entrepreneur. Even more pertinent is that Casson wrote the fundamental traits of his thoughts at the beginning of the 1980s, a period during which the liberal policies introduced in the industrial countries sought, by the promotion of the spirit of enterprise, to attenuate the harmful effects of the unemployment which burst on the scene following massive redundancies and the failure of many businesses.

To arrive at creating one’s own business, the demands are numerous: the capital (personal savings); what are the legal forms in which the firm may take shape (limited liability company, partnership. . .); and what is the level of institutional qualification, the professional experience

of the entrepreneur (has he been salaried before venturing into entrepreneurship). On what networks of relations, personal, family, and professional can he depend? The question of capital always poses problems. It is difficult to borrow because potential lenders do not necessarily share the enthusiasm or the anguish of the entrepreneur. To skirt round such obstacles, Casson affirms that it may be preferable either to take an executive position or to save up for the needed capital by taking on some routine work before committing oneself to a career as an entrepreneur. He adds that there exist a large number of organizations (especially the great conglomerates) which specialize in the selection of entrepreneurs. This signifies also that the creation of a firm is not only an individual decision, but it is also closely linked to the dynamism of the economy, and vice versa. The greater the number of new businesses in an economy, the more it is capable of renewing itself and consequently of developing further. This filtering of new vocations is carried out principally through qualifications obtained at university, in business schools, or professional associations. The educational system also plays an important role in the development of entrepreneurial capacities. To find the capital necessary for launching a business, the entrepreneur may have recourse to the banks, but these are not always favorable to the financing of entrepreneurial projects. According to Casson (Casson, 2003), the principal alternative to the bank remains the family. But the family such as conceived here has nothing in common with the 200 families that became shareholders in the *Banque de France* in the 1930s!

Two principal factors make the family an effective substitute for the bank or for all other forms of institutional finance in the creation of a business. First of all, a family develops over several generations. The most senior generation can thus offer finance to the youngest. Then, the lenders commit their capital with confidence because of the positive image they have of the family. But, one can also ask why today many new entrepreneurs create their firms without even looking for help from the public. It is often

through ignorance but also because such entrepreneurs, coming from modest backgrounds, and which constitute a good proportion of new entrepreneurs, mobilize forces they know and which they can influence. Two networks to support the creation of new businesses exist, one institutional, the other informal. They can be complementary (as is often the case), but it can be noticed, particularly in cases of firms created by entrepreneurs with few or no qualifications, that family networks easily win the day over the institutional networks.

If the family defaults, the other solution consists for Casson for the would-be entrepreneur to work still harder and save even more. He gives up his leisure and renounces consumerism so as to get more rapidly the extra funds he needs for investment. Leisure is among the least important functions for the entrepreneur, not only on account of the very nature of his activity (it is often difficult to define the boundary between work and leisure) but also because the entrepreneur has something to prove to others, that is, that his judgment is correct.

D. B. Audretsch: The Entrepreneurial Society

At the beginning of the 1980s, D. A. Audretsch (with Z. Acs) (Acs and Audretsch, 1988) focused his attention on innovative small and medium enterprises. This represented an important segmentation in theoretical terms. Since the beginning of the nineteenth century, for many economists, only big enterprises had been innovative. During the period 1960–1970, J. K. Galbraith and A. Chandler had demonstrated the superiority of large firms in producing new technologies and knowledge. Galbraith underlines that it is not the entrepreneur who put man on the moon but a whole organization. Galbraith points his attention towards economic and technological convergences between capitalism and socialism. Both are based on large firms, and State regulation plays an important role. So, in a very famous article (published in 1988), Audretsch and Acs showed the important capacity of small enterprises to innovate in certain specific industrial sectors (e.g., microelectronics and microinformatics).

During the period 1980 up to the 1990s, Audretsch (Audretsch, 2007) centered his analysis on university spillovers. He showed that innovative small enterprises are localized in very specific geographic areas around university centers. He focused his analysis on various new technology sectors (e.g., biotechnologies). He analyzed deeper relationships between academic research and entrepreneurship. So, small and medium enterprises play an important role in developing new activities in very specific sectors (knowledge-intensive). They are not the result of the collapse of heroic capitalism. They contribute actively to producing new technologies and knowledge.

But, an important part of Audretsch's research program is concentrated on the evolution of capitalism. Political events at the end of the 1990s (fall of the Berlin wall and the end of the USSR) gave capitalism a new geographical and social area of expansion. Since the 1990s, capitalism has been the only economic and social organization. But, at the same moment, the structural organization of capitalism has changed: small enterprises are taking a new place in capitalist countries. Governments are developing new policies to support entrepreneurship. For Audretsch, a new balance has to be developed between political and economic democracies. Politically, western countries (in Europe, as in America) are democracies. But, during the 1950s–1970s, their economies were very concentrated on the economic power of a small number of big firms, especially in the United States. So, it was essential to create a real balance between political and economic democracies – in other words, between political decentralization and economic decentralization of power. In a capitalist society, the entrepreneur must to have the opportunity to develop his (or her) activities, to create new jobs and new (innovative) activities.

So progressively, the nature of capitalism has changed. Market regulation replaces state regulation (or Keynesian regulation). For Audretsch, a new society has appeared: the entrepreneurial society. It is not a society where large firms have disappeared, but a society where people have opportunities to create a business and

where the governance of large firms has changed. They have adopted entrepreneurial behavior. Competition in the new context is based not on prices (like during 1950s–1970s) but on innovation. So, large firms have to be more creative.

This evolution of capitalism is taking place in an historical context. After the Second World War, the objective was to produce goods and to rebuild the economies of western countries (to face the communist threat). Since the end of the 1970s, world economic competition has changed. New economic actors (in Asia, but also in South America) have taken their place in world markets. In this context, to keep their place in world markets, developed countries must innovate. World competition is based on innovative products and services. In this context, the entrepreneur according to Audretsch is still a hero.

Conclusions and Future Directions

It is illusory to try and search in the economy for an entrepreneur labeled Schumpeterian, Hayekian, or others. The entrepreneur is not embodied in a specific personality. Since Cantillon, up to the present day, it is in terms of the function of the entrepreneur that we must speak or, still more, conceive the entrepreneur as a type of ideal, to revert to the categories of Max Weber. The function of the entrepreneur is to schematize the mechanism for change and for the introduction of innovations. The essential question is to highlight the mechanism due to which the creation of new knowledge is achieved. As an attentive observer of the economic, social, and technological world which surrounds him, the entrepreneur has the capacity to detect new investment opportunities which could prove to be sources of profit. Investment opportunities stem from situations of uncertainty, which in their turn originate from competitive movements between firms. However, to detect an investment opportunity is not a guarantee of profit. Numerous entrepreneurs, yesterday and today, have failed in the process of creating a business in an activity a priori rich in positive prospects.

Cross-References

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- ▶ [Individual Determinants of Entrepreneurship](#)
- ▶ [Industrial Atmosphere](#)
- ▶ [Schumpeterian Entrepreneur](#)

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Speaking Pictures: Innovation in Fine Arts

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Synonyms

[Art](#); [Communication](#); [Fine art](#); [Graphic](#); [Intelligence](#); [Language](#); [Pictures](#); [Speaking](#); [Visual](#)

Introduction

Quite often innovations are discovered when a researcher is developing a new theory and realizes that this theory can be applied to an innovation in another discipline. Such was this case in which a theory to categorize intelligence could be applied to graphic art. So this entry will start at the beginning with intelligence.

Although intelligence itself cannot be satisfactorily defined, it is at least possible to describe various aspects. Until recently the prevailing opinion, attributed to Freud, was that people have a consciousness, which harbors the light of intelligence and rationality, and a subconsciousness, an unfathomable dungeon which harbors the dark forces of primeval drives. But this division was artificial since most of people's daily activities are performed by their minds without troubling them with conscious mental activity (how much time does a person spend thinking about breathing, walking, not tripping, not bumping into things, keeping his heart beating, or digesting his food?); indeed, almost everything people do is without consciously thinking about it. In the section on orders of intelligence, the current opinion will be presented that, within the brain, consciousness is spatially multiple but temporally singular. This temporal singularity is called awareness, and it is the tip of a mental iceberg that shifts with the ebb and flow of consciousness. There is no sharp distinction between consciousness and subconsciousness; there is only a continuum of awareness.

There are, however, domains of intelligence for which a specific type of intelligence can be identified. The types of intelligence which will be discussed in this introduction are the lingual (language) and the sensual: visual (sight), auditory (sound), olfactory (smell), gustatory (taste), and tactile (touch). Of course intelligence can be viewed from different perspectives, which will be discussed later, but the aforementioned classification is most useful for the present considerations. It will be demonstrated that these types of intelligence generally process data independently and can even arrive at results which are conflicting. Nevertheless, by defining domains of intelligence and grouping these domains into environments, a powerful tool is obtained that enables one to define a partial ordering for intelligence which produces some rather startling results.

Types of Intelligence

Since language is the most pronounced characteristic that distinguishes humans from animals, the prevailing opinion of many scientists and philosophers has been and still is that language is the essence of intelligence; indeed, language and intelligence could somehow be considered equivalent. Especially written language, the written word was mystic. "In the beginning was the Word, and the Word was with God, and the Word was God" (the Gospel according to Saint John). Plato considered the word to be the essence of reality, the object itself being only a virtual reflection. Human ancestors even considered the word to be so powerful that words for dangerous objects were avoided. For example, the word "bear" derives from the same root as "brown," because they were afraid to call it by its original name "*árktos*" or it might hear its name and appear, and no one wants a bear in his tent. But bears, not being as clever as humans, would not realize that they were being called "brownies."

Although language often dominates our thoughts, especially when writing a book, there are other forms of nonverbal intelligence which are just as important to the entire complex of

intelligence; some of these types, such as visual intelligence, are even more powerful than the lingual intelligence. The intention in this introduction will be to review types and limitations of intelligence as a preparation. For the purpose of the discussions, "intelligence" will include perception, reasoning, memory, and all associated processes.

Are animals intelligent? Anyone who has pets, particularly the ubiquitous cats and dogs, would certainly agree that they are. At least cats are not too stupid to come in out of the rain. But even the doubters must agree that the primates, especially chimpanzees, demonstrate behavior which must be considered intelligent. Yet these animals do not have languages, although they do have a limited communication consisting of grunts, whistles, and grimaces. For a long time, some scientists thought that chimpanzees must be intelligent enough to use at least a simple language, the only inhibitor being their inferior vocal cords. The results have been disappointing and inconclusive at the best. The problem is not that chimpanzees lack vocal cords, but that they lack a language center in their brains. What is apparent here is that intelligence is possible without language. In fact there are different types of intelligences, and to each of these intelligences, there is an associated art form.

Before continuing, it is necessary to do the impossible and define art, but first consider the following questions:

1. Is an alpine scene in nature art?
2. Is a photograph of this scene art?
3. If the photograph were from Ansel Adams, would it be art?
4. Would a painting of the same scene be art?

Definition: *Art is an intentional form of communication directed to one or more of a person's sensual intelligences.* Thus, music is communication to the auditory intelligence, pictures to the visual, etc. Now it is possible to answer the questions:

1. An alpine scene, however beautiful, is not a form of communication; it simply is there and thus not art.
2. If the photograph is simply a snapshot to remind the viewer of a pleasant trip, similar

to an entry in a diary, then it is also not intentional communication to a sense and is not art.

3. Ansel Adams was a talented photographer, and his published photographs were definitely an intentional communication to the visual and even emotional senses. Certainly art.
4. It is impossible for a painter to simply record a scene as a camera; he must always interpret it, thus art.

Note that art must be directed at one or more *sensual* intelligences. Thus, a communication wholly within the domain of lingual intelligence, such as a mathematical textbook, is not art. Poetry, however, which is communicated in language but directed at our sensual intelligences, is art. In the preceding only the concept art has been defined and not quality. In evaluating the quality of any work of art, three basic questions must be asked (Perrine 1987):

1. What is its central purpose?
2. How fully has this purpose been accomplished?
3. How important is this purpose?
 - (2) should be rephrased as:
 - 2) How effectively has this purpose been communicated?

The first question must be asked in order to understand the work of art. Questions (2) and (3) are those by which it can be evaluated. Some critics have objected to the use of such terms as “purpose” and “intention” altogether; no one can know, they maintain, what was attempted in the work of art, only what was done.

This view is questionable. The artist must have a purpose to produce any work of art, although an outsider may not be able to determine it, which makes it more difficult to understand and evaluate the art. The results of any randomizing process may be pleasant, but they are not works of art. Since this is often not understood, especially by the undiscerning, the gates are wide open to charlatans. It is easy, maybe even fun, to dump a bucket of gore on a canvas and wallow around on it in a marijuana trance, but the result is not art (unless the purpose of the creator is to present chaos, but even this is debatable), although

a clever perpetrator may sell it by the meter to enthusiastic New York matrons and then wallow in fame and riches.

It is obvious that computers, which, in spite of the advances of artificial intelligence, do not even remotely possess intelligence, cannot produce art. This is often confused because artists use computers as tools to produce art, but it is the human and not the computer who is the artist.

Can animals, which are intelligent, produce art? This is a difficult question to answer. There was a female chimpanzee at the Viennese zoo that painted pictures which were selling briskly, primarily due to their novelty, the proceeds being donated to the zoo. If you watched the chimpanzee, you noticed that she spent about as much time sucking on the paint brushes and licking the paint (which was food coloring) as she did spreading the paint nonchalantly over the paper. It appeared that she had no intentional purpose, but who knows? Eating some of her own “art work” is no criterion because, after all, cooks do it too.

The previous discussion of art was necessary in order to understand why types of art are associated with types of intelligence. The following is a brief discussion of several types of intelligence and is not intended to be rigorous, since the main purpose of this entry is to present a specific artistic innovation which is in the next section. However, this discussion will help to provide a better understanding of the prerequisites necessary for the innovation.

Visual intelligence: associated with sight

Auditory intelligence: associated with hearing

Olfactory and gustatory intelligence: associated with smell and taste

Tactile intelligence: associated with touch

Other Types of Intelligence?

In addition to the five classical senses, there are also various organic senses such as hunger, thirst, fatigue, or balance, which are also necessary for the entire complex of intelligence but which will not be covered since they have no direct influence for the further development. In order to make this

distinction more exact, the following definitions must be introduced:

1. A *sensual intelligence* is a type of intelligence corresponding to one of the five classical senses.
2. A *monitoring intelligence* is a type of intelligence corresponding to one of the other organic senses.

The approach taken up to now has been reductionistic. If there were a good understanding of intelligence, a holistic approach might be better, but there is not. Thus intelligence has been reduced to types because this will make it possible to draw some very remarkable conclusions.

Of course there are other useful approaches to partitioning intelligence, one of the most influential being that of Howard Gardner.

Gardner's influential 1983 book *Frames of Mind* (Gardner 2011) was a manifesto refuting the IQ view; it proposed that there was not just one, monolithic kind of intelligence that was crucial for life success but rather a wide spectrum of intelligences, with seven key varieties. His list includes the two standard academic kinds, verbal and mathematical-logical alacrity, but it goes on to include the spatial capacity seen in, say, an outstanding artist or architect; the kinesthetic genius displayed in the physical fluidity and grace of a Martha Graham or Magic Johnson; and the musical gifts of a Mozart or Yo-Yo Ma. Rounding out the list are two faces of what Gardner calls "the personal intelligences": interpersonal skills, like those of a great therapist such as Carl Rogers or a world-class leader such as Martin Luther King, Jr., and the "intrapyschic" capacity that could emerge, on the one hand, in the brilliant insights of Sigmund Freud or, with less fanfare, in the inner contentment that arises from attuning one's life to be in keeping with one's true feelings.

The abilities related to personal intelligences can be expanded into five main types:

1. Knowing one's emotions
2. Managing emotions
3. Motivating oneself
4. Recognizing emotions in others
5. Handling relationships

These abilities then enable the four separate skills of interpersonal intelligence:

1. Organizing groups
2. Negotiating solutions
3. Personal connection
4. Social analysis

The advantage of Gardner's partitioning of intelligence is that it allows a person to recognize his own potential deficiencies for success. Indeed Gardner's concepts are being used in experimental classes in some schools to improve student performance.

In this entry, emotions and feelings are not classified as intelligences but as aspects which are necessary for intelligence, and are included with other aspects, such as drives and instincts, which are also necessary. In his book, *Descartes' Error* (Damasio 1994), Antonio Damasio demonstrates that patients with specific brain lesions that hamper their emotions also suffer loss of their reasoning ability. In fact he states that "Reduction in emotion may constitute an equally important source of irrational behavior" (p. 539). The reason for this is that persons usually do not have sufficient information to make logically "correct" decisions but must rely on gut feelings to come to a conclusion. Patients who have brain lesions that diminish the processing of emotions may remain intelligent, as far as IQ tests are concerned, and knowledgeable, but incapable of making decisions because they cannot include emotions and feelings in the process.

An emotion is a psychical reaction to a specific situation or experience, whereas a feeling is the mental awareness of a bodily state. Although there are many emotions, the primary feelings are happiness, sadness, anger, fear, and disgust. It should be remembered that the brain and body communicate not only electrically through neurons but also chemically (hormonally) through the blood and that this communication is a feedback process, actually a cybernetic regulation. It is from this feedback that a person's brain becomes aware of his bodily state and feelings arise. For example, a person may experience the emotion of love, but whether he feels happy or sad depends on the reaction of the loved one to his

emotion and the resulting bodily state. In artificial intelligence it would be easy to program emotions but impossible to program feelings with the current state of the art.

The important fact here is that reasoning does not just depend on an abstract process called logic, but also on human characteristics of emotions and feelings, characteristics that are generally considered animal as compared to the spiritual of thought.

Lingual Intelligence

Lingual intelligence is one of the most important types of intelligence for humans, especially if someone is writing a book. Indeed, some researchers have considered lingual intelligence to be the essence of intelligence, i.e., only if something can be verbally formulated as a concept can it be processed with intelligence. This idea that language and intelligence are somehow equivalent dates back to ancient Greece. Plato philosophized that one can only discover reality through reasoning (intelligence) in which one conceptualizes ideals that represent an a priori true reality which is eternal, as opposed to the world of our senses which is fleeting. This type of philosophy is called idealism.

Aristotle is also called the father of logic because he was the first person to formalize language to abstract the process of intelligence. This type of logic is called syllogistic logic (to draw a conclusion) and is used to deduce a conclusion from premises.

Since language seems to be such an essential element of our formal thought process, does this mean that one cannot have thoughts that cannot be verbalized (formulated in language)? The answer is yes if restricted to lingual intelligence, but no if the other types of intelligence are included. Because the other types of intelligence are neglected in schools and not generally recognized, this is why most people are so restricted in their thoughts by their own language and probably why creativity, which requires the other types of intelligence, is so rare. For an interesting theory on the origin of

language, see *The Semi-Aquatic Theory* (Campbell and Campbell 2011).

Fortunately, this problem can be avoided by not defining intelligence but by defining the domains of each type of intelligence and then ordering these domains.

Definition: The *domain* for each type of intelligence of a specific individual (human or animal) is the range of phenomena which that type of intelligence can perceive and process. Specifically for each individual:

1. The domain of visual intelligence is the spectrum of visible light.
2. The domain of auditory intelligence is the range of audible sound.
3. The domain of olfactory intelligence is the set of odorous substances (according to Henning a mixture of the six qualities: fragrant, spicy, ethereal, resinous, putrid, and burned).
4. The domain of gustatory intelligence is the set of substances capable of being tasted (a mixture of the qualities: bitter, sour, salt, and sweet).
5. The domain of tactile intelligence is the physical state of the individual's immediate environment (the cutaneous qualities: pressure, pain, warmth, and cold).
6. The domain of lingual intelligence is the passive vocabulary of the individual. (This domain only exists for humans.)

Aspects of the Physical vs. the Conceptual Environment

Obviously there is a basic difference between the physical and conceptual environments. The physical environment exists in the physical world and is perceived by our respective types of intelligences through the interface of the corresponding senses. The conceptual environment, on the other hand, exists only in our minds and is perceived directly by our lingual intelligence without any interface to the outside world. This means that in order to communicate (or interact with the external environment) with lingual intelligence, a person must employ one or more sensory intelligences. This communication will be explored in

detail because it will open new areas of artistic expression. The following is a list of the current types of sensory communication with examples:

1. Sight: only digital communication; e.g., alphabets, hieroglyphs, Chinese characters, sign language (ASL), heliographs, smoke signals, and signal flags
2. Sound: both analog, such as speech, and digital, such as Morse code
3. Smell: none
4. Taste: none
5. Touch: digital, such as Braille

The senses of smell and taste are too cumbersome to be used for viable lingual communication. The sense of touch is probably too inert for analog signals.

It is obvious that the only sensory signal which a human can produce, that has a high enough frequency to be suitably modulated, is sound (voice). This is the reason why the original lingual communication was speech. Nonetheless, light is also suitable for analog communication since the wave frequencies are even higher than those of sound. Now that the technical means exist, it would be possible to convert speech into a light spectrum and either project it into a room or display it on a screen. With practice one could understand this visual speech, although perhaps only a child would have the mental adaptability to master it. In any case this would open up a whole new range of graphical art, an art in which a person not only sees the forms and shapes but also sees them “speaking” to him through a modulation of the colors.

In the beginning probably abstract art with few objects would be the most convenient for such a speaking picture so that it would not be too confusing for the viewer. At first a blank screen with only a few words would be the easiest to learn, but then the pictures and language could be more complicated.

What is the point in all this, you might ask. This question is not relevant because one could ask what the point is in all art. Art communicates to the senses, and if it is possible to communicate to several senses in one picture, a major breakthrough has been achieved.

Quite often there are variations in existing art forms, but this represents a completely new artistic development. Truly a useful and challenging artistic innovation.

Conclusion and Future Directions

For more than 19,000 years, since the wonderful Paleolithic cave paintings of Lascaux, humans have been representing the world of their senses in graphical form, for esthetic, religious, and simply enjoyable reasons. There is no reason to doubt that graphic art will exist as long as humans do. However, since the cave paintings, there have been frequent changes in style (not always positive), but the results have always been basically similar: graphic art has remained a two-dimensional art form that has only been directed to a person’s visual intelligence. Of course some graphic art contains written text, but this has always remained static. This entry presents a method of expanding graphic art to a means of addressing both the visual and lingual intelligences in a dynamic mode and should open up a whole new area of artistic representations and add a new facet to the developing knowledge society.

Of course the question arises whether this addition to graphic art is simply a novelty or is actually meaningful. A few decades ago, the answer would have been that it is only a novelty, but with the rapid advances in technology, it certainly has a future. It has been seriously predicted that within a few years, new dwellings will be constructed with an entire wall as a display, either LED or newer technology. This display wall will be used for TV and various types of information. When the wall is not in use, it has been suggested that it can be used to display pictures. Such a wall would be ideal for speaking pictures which are not intrusive such as sound is but can be enjoyed in pensive moments. The future looks bright for speaking pictures.

Cross-References

- ▶ [Artistic Research](#)
- ▶ [Creativity and Emotion](#)

- ▶ [Creativity and Innovation: What Is the Difference?](#)
- ▶ [Creativity, Experiential Theories](#)
- ▶ [Linguistic Dimension of Creativity, Invention, Innovation, and Entrepreneurship](#)
- ▶ [Preparing a “Creative Revolution” – Arts and Universities of the Arts in the Creative Knowledge Economy](#)
- ▶ [Science of Creativity](#)

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Special Situation

- ▶ [Entrepreneurship and Financial Markets](#)

Spin-off

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Synonyms

[Carve-out](#); [Leveraged buyouts](#); [Sell-off](#); [Split-offs](#); [Split-ups](#)

Definition

There exists a variety of definitions of what constitutes a spin-off organization (Pirnay et al. 2003). According to Carayannis et al. (1998), for

example, a spin-off organization designates “a new company that is formed by individuals who were former employees of a parent organization (...) around a core technology that originated at a parent organization and that was transferred to the new company” (Carayannis et al. 1998: 1). Zhara et al. (2007) further suggested that a spin-off organization is “a separate legal entity that is set up to commercialize new technology that was originally developed by a university or an established corporation” (Zhara et al. 2007: 572). One should therefore discriminate between two types of spin-off organizations depending on the legal status and activity of their parent organizations: (1) corporate spin-offs and (2) academic spin-offs (e.g., university spin-offs).

Corporate Spin-Offs

Corporate spin-offs (CSOs) involve companies that encourage their managers and employees to establish dedicated organizations so as to commercialize new technologies (Chesbrough and Rosenbloom 2002; Jong 2006). CSOs are often based on the “separation of a subsidiary or division from its parent company by creating an independent company where the parent shareholders retain proportionate equity interest” (Uddin 2010: 43). More specifically, Zhara et al. (2007: 573) explained that corporate spin-offs “result from managers and employees’ initiatives aimed at creating momentum for a new business or technology that falls outside the parent firm’s skill base” (Zhara et al. 2007: 573). Spinning-off, therefore, enables the parent corporation to create value from the commercial exploitation of in-house knowledge and technologies not belonging to its core business portfolio. Incidentally, large corporations might be tempted to “reduce their size by spinning-off one or more division” (Veld and Veld-Merkoulova 2009: 407), considering spinning-off as a divestiture instrument that is likely to improve returns and create value for shareholders (Cusatis et al. 1993; Johnson et al. 1996). As Veld and Veld-Merkoulova (2009) argued, “in a spin-off, the shares of a firm’s subsidiary are distributed pro-rata among shareholders of the company. No cash transaction takes place. After the spin-off, the

shareholders of the parent company hold shares in both the parent company and the subsidiary” (Veld and Veld-Merkoulova 2009: 407). This might contribute to explain why corporate spin-offs are “viewed by the market as value-increasing” (Veld and Veld-Merkoulova 2009: 417), particularly when they (1) involve assets outside the core business of the parent firm and (2) are nontaxable.

CSOs should be distinguished from alternative methods of divesting assets, including sell-offs, leveraged buyouts, split-ups, split-offs, and carve-out. The main differences between the above divesting strategies can be stated as follows. With sell-offs, “the parent firm divests assets to a third party. The assets typically are exchanged for cash and/or other securities” (Nixon et al. 2000: 278). The foregoing transaction does not alter the size of the selling company but convert real assets into liquid assets, generating discretionary cash for shareholders. A leveraged buyout “is the purchase of the stocks or assets of a company, or a subsidiary of a company by an investor group that normally includes the management of the organization which is being ‘bought’” (Woo et al. 1992: 433). With a split-up, “the shares of all the subsidiaries that comprise the firm are distributed,” while in a split-off, “the parent’s shareholders have to exchange the shares of the parent to obtain the shares of the subsidiaries” (Veld and Veld-Merkoulova 2009: 418, note 3). Consequently, in a split-up as well as in a split-off, the parent company disappears. Finally, in an equity carve-out, a cash transaction is realized between the public and the parent company since “shares of subsidiary are sold to the public” (Veld and Veld-Merkoulova 2009: 418, note 3).

Academic Spin-Offs

Contrary to corporate spin-offs, academic spin-offs (ASOs) never result from a divestiture strategy adopted by universities to reduce their size and improve their market-value. They represent “new entrepreneurial activities (...) set up by professors, young researchers, PhD students” (Chiesa and Piccaluga 2000: 331) who aim at translating scientific knowledge into innovative

products, services, or technologies (Van Burg et al. 2008; Clarysse et al. 2007). Hence, academic spin-offs are necessarily “generated within academic contexts or private and State-owned research labs” (Chiesa and Piccaluga 2000: 331), their activities being oriented toward developing technical ideas or technology. Therefore, academic spin-offs are necessarily founded by – at least – one faculty member, staff member, student, or researcher who left the university to establish an entrepreneurial firm and exploit a discovery or technology he/she developed within the university (McQueen and Wallmark 1982; Smilor et al. 1990). As indicated by Zhara et al. (2007), “university spin-offs are created by academic entrepreneurs, faculty and graduate students to commercialize their discoveries. These firms are founded by one or more academic inventors (faculty or student or staff), who may (or may not) be currently affiliated with the academic institution and/or the firm, and is created based on a license or other agreement with an academic institution to transfer a core technology” (Zhara et al. 2007: 572).

Elaborating a typology of science-based entrepreneurial firms originated from a university, Pirnay et al. (2003) discriminated between four types of university spin-offs depending (1) on the status of individuals involved in the newly created science-based entrepreneurial firm (i.e., researcher or student) and (2) the tacit or codified nature of the knowledge transferred from university to the new venture (Pirnay et al., 2003: 358). Scholars also distinguish public research spin-offs established by universities from private research and technology (R&T) organization spin-offs. As Davenport et al. (2002: 241) argued, “it is relatively rare to find case studies of spin-offs from research and technology institutes (RTIs) that are not universities.” Although both types of organizations produce scientific knowledge, the main differences between universities and RTIs reside in their respective research processes and objectives which, in turn, are determinative for the particular strategy adopted by researchers for transferring technology (e.g., spin-offs versus licensing) or raising funds (e.g., public money versus venture capital).

Basically, private science-based organizations, alike corporations, “aim especially at exploitation and application, are much more focused in trying, and appropriate research results (through patents, secrecy, etc.) as much as possible; very rarely (...) they produce knowledge *just* for the purpose of diffusing it” (Chiesa and Piccaluga 2000: 329). Subsequently, in contrast with public research labs at universities, private R&T organizations are likely to focus on short- and medium-term research associated with direct economic applications and returns. However, the foregoing distinction between private and public research-oriented organizations tends to disappear since public research laboratories are more and more involved in valorization and commercialization of scientific knowledge, adopting profit-oriented, short and medium terms, strategies (Chiesa and Piccaluga 2000; Pirnay et al. 2003).

Research Questions

There exists a vast literature on spin-off companies. Scholars focus on three sub-themes: (1) the motives and objectives attached to the creation of a spin-off company, (2) the performance of spinning-off a business unit or a technology for the parent organization as well as the new company, and (3) the implications of spin-offs for public policy (financial support, fiscal policy, innovation policy, etc.).

Motives

Spin-offs occur for a variety of reasons. By and large, scholars discriminate between two types of motives and/or objectives driving spin-offs’ creation: (1) knowledge-oriented and (2) value-oriented. Regarding the first set of motives and objectives, it has been demonstrated that spin-offs facilitate the transfer and exploitation of knowledge by enabling universities and corporations to create separate organizational forms dedicated to the production and commercialization of new products and/or technology. Therefore, spin-offs are considered as an effective strategy for exploiting in-house knowledge and

technology, providing their parent organizations with additional sources of revenue. Regarding the second type of motives, a corporation is likely to spin-off a business unit or a technology if it expects such divestiture strategy will “have a positive effect on the shareholders value due to removal of diseconomies, increase in efficiency, and paying more attention to core business” (Uddin 2010: 43). Krishnaswami and Subramaniam (1999: 74) further argued that spin-offs generate “abnormal returns” even in the long run. Among the causes of the positive impacts attached to spin-offs, the authors mentioned “improvement in focus and the elimination of negative synergies, transfer of wealth from bondholders to shareholders, tax and regulatory advantages, and recontracting benefits after the spin-off” (Krishnaswami and Subramaniam 1999: 74).

Performance

Performance is a central research question addressed by scholars and students of university and corporate spin-offs. The question revolves around the identification of its *sources* and the definition of *performance indicators* attached to spin-offs which could be applied to evaluate the impact of spinning-off a technology, a business unit, or a division for the parent organization and/or the newly formed entrepreneurial firm.

By and large, performance measures are computed by using public information revealed by firms and/or available on stock markets. Investigating the long-run performance of a sample of parent firms identified from the stock distribution by firms trading on the NYSE, Amex, and NASDAQ, Hollowell (2009) demonstrated that, in the long run (4-year period), “spin-offs outperformed the market” (Hollowell 2009: 120). To arrive at this conclusion, the author used the following indicators: cumulative average adjusted returns calculated in excess of the market benchmark and buy-and-hold returns calculated for sample firms and market index. In the same vein, Klein and Rosenfeld (2010) compared the respective performance of conventional versus sponsored spin-offs. Contrary to conventional spin-offs, sponsored spin-offs need to raise

external capital and receive cash flows from outside investors. Focusing on profitability measures (ROA), the authors indicated that “sponsored spin-offs are underperformers over the postevent periods” (Zhara et al. 2007: 243).

Early research on spin-off performance, however, tended to focus exclusively on parent organizations. Woo et al. (1992: 434) pointed out that few studies focus “on the performance of the divested units, rather than that of the divesting firms.” Investigating divested units’ performance, Woo et al. (1992) assumed “that *relatedness* between the divested unit and the prior parent firm” is likely to influence “post-spin-off performance” (Woo et al. 1992: 346). The definition of the concept of relatedness is based on “joint activities, resource sharing or cross-market coordination established upon a high degree of similarity along both supply and demand dimensions between the spin-off unit and the rest of the parent firm” (Woo et al. 1992: 346). Within this framework, the authors demonstrated that related subsidiaries exhibit better performance than unrelated ones. To reach such a conclusion, the authors adopted the following performance measures (Woo et al. 1992: 439): return on assets (i.e., net earning on total assets ratio), market-to-book ratio (i.e., market value/share on stockholders’ equity/share ratio), and inflation-adjusted sales (i.e., annual compounded rate of growth of inflation-adjusted sales). Adopting a knowledge-based perspective, Zhara et al. (2007): 584 developed a comparative study of the performance of university spin-offs and corporate spin-offs using three performance measures: productivity (overall sales/full-time employees), profitability (i.e., return on assets), and revenue growth (i.e., year-to-year changes in a spin-off revenue multiplied by 100). Within this framework, the authors shed light on the role played by internal factors (e.g., resources, capabilities, network, and inheritance from parent organizations) in significantly shaping spin-offs’ performance. In particular, Zhara et al. (2007: 594) demonstrated that CSOs outperformed ASOs since they “benefit from the skills transferred through their founders and employees who had worked for their parent corporations and

maintained contacts with their friends and associates there.” The foregoing enables CSOs’ founders to mobilize prior experiences, networks, and connections (social capital) so as to access and absorb knowledge and fully realize commercial opportunities. De Cleyn et al. (2009: 53) confirmed that university spin-offs exhibit poorer performance merely because their founders “often lack industry experience (...) their managerial skills for leading a venture (which are different from those needed to lead a research group) (being) mostly underdeveloped.” In addition, the authors explained that the publication-oriented culture, which characterizes researchers’ mindset, “contrasts with a commercial attitude where trade secrets and hidden agendas sometimes play an important role” (De Cleyn et al. 2009: 53).

Public Policy

The implications of spin-offs for public policy have been documented by scholars and can be summarized as follows. First, policy-makers should lessen the barriers to technology transfer and commercialization by implementing a legal and fiscal environment (e.g., intellectual property protection, Bayh-Doyle Act) which encourages public and private investments in basic research and research and development (R&D). In many countries, “national policy has been changed to provide universities with intellectual property rights (IPR) ownership and a formal responsibility for the commercialization of patentable technologies” (Rasmussen and Borch 2010: 611). This has fostered innovation and growth in many different industries. Second, policy-makers aim at providing financial and relational supports for public research, and small-firms’ R&D, which are expected to have (positive) impacts across industries (Cohen et al. 2002). In this way, policy-makers often provide individuals and companies with fiscal incentives (e.g., tax reductions) to support both ASOs and CSOs. They also facilitate the establishment of relationships between public agencies, industry funding, and venture capitalists so as to enable spin-offs’ founders to access resources needed to face those complex problems occurring “at a point along

a new high-tech venture's expansion path preventing it from achieving the transition from one development phase to the next" (Vohora et al., 2004: 159).

Empirical Evidence

Empirical examples of spin-offs are widespread in the literature (Klepper 2001; Veld and Veld-Merkoulova 2009). A few examples are presented here. Chesbrough (2003) documented 24 spin-off companies created by former researchers at Xerox's Palo Alto Research Center (PARC) from 1979 to 1998, some of which becoming leaders in their respective industry (e.g., Adobe, 3Com). Chiesa and Piccaluga (2000) also reported many examples of academic and corporate spin-off companies created in France, Sweden, Scotland, the Netherlands, the USA, and Italy over the last three decades. Debroux (2008) illustrated how university spin-offs emerge as an effective entrepreneurial strategy for developing and commercializing technology within the Japanese Innovation System, the latter being dominated by large corporations' laboratories and R&D facilities. Addressing the relationship between public research and industrial development, Feldman and Desrochers (2003) and Jong (2006) examined how the Johns Hopkins University (Hopkins), and the University of California (Berkeley), Stanford University (Stanford), and the University of California San Francisco (UCSF) promoted the formation of spin-off companies. While Hopkins had limited impact on regional development (Feldman and Desrochers 2003: 20), it has been demonstrated that UCSF played a critical role in the formation of the San Francisco biotech industry, while Stanford greatly influenced the emergence and development of the Silicon Valley high-tech electronics industry (Jong 2006: 277).

Conclusions and Future Directions

Fostering the creation, diffusion, and exploitation of knowledge raises critical challenges for

policy-makers, corporate firms, and universities. Future research on spin-offs should be directed toward investigating how it integrates with other organizational forms facilitating knowledge transfer, innovation, and value creation. The development of effective organizational forms to exploit internal and external knowledge is likely to involve organizational changes at various levels. As Veld and Veld-Merkoulova (2009): 418 argued, an "interesting topic for future research relates to the fact that there are still many large conglomerates that combine many unrelated divisions (...) this raises the question of why these conglomerates are still in one piece." The divestiture of a corporation's subsidiary or the creation of an academic entrepreneurial company, therefore, could be investigated from a design-oriented perspective. The foregoing would provide a framework for dealing with the various dimensions attached to the creation of spin-offs (e.g., public policies, fiscal incentives, funding issues, public-private partnerships). Considering the implications of the spin-off phenomena from an organization-design perspective would deepen our knowledge of the organizational and relational architecture supporting interactions between firms, universities, public agencies, and investors. In addition, special efforts could be dedicated to the identification of "good practices" associated with the creation of spin-off companies. The identification of good practices for both academics and corporations would enlarge our understanding of the factors influencing the performance of spin-off companies. Finally, most research efforts focus on technology-driven spin-offs. It would be interesting to go beyond technology-based and investigate service-based spin-off companies as a mean for academics and corporations to create value and generate additional revenue.

Cross-References

- ▶ [Academic Firm](#)
- ▶ [Corporate Entrepreneurship](#)
- ▶ [Extrapreneurship](#)
- ▶ [Innovation Opportunities and Business Start-up](#)

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Split-Offs

- ▶ [Spin-off](#)

Split-Ups

- ▶ [Spin-off](#)

Startup

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Synonyms

[Age zero firm](#); [Dotcoms](#); [Gazelle](#)

A startup company is a company that is in the first stage of its operations, mainly in the fields of information technology. The products, systems, or services (PSS) involved in those operations aim at satisfying needs in consumption as well as in production goods sectors. In the late 1970s, the most common type of startup company is producing electronic devices such as microprocessors and digitalized circuits (hardware). Then, in the late 1980s, appear startup companies producing standardized programs and operating systems (software). In the late 1990s, hardware and software converge through the Internet into a specific pattern of companies known as “dotcom” companies. From then on, the concept of startup company becomes widely used to name those specific structures.

Particularly, the financing is rather innovative. Special money named seed capital is the capital used for financing projects during their startup phase, before production commences (research, market studies, etc.). It is provided by specialized funds, business angels, etc. What the financiers take into account are:

- An opportunity of investment, identified by some entrepreneur(s)
- A product, a system, or a service (PSS), designed to satisfy the identified need
- Ownership of the main features of this PSS by the entrepreneur (patent, copyright, skills)
- Advantages of the investment linked to specific technological features
- Benefits for customers and clients in terms of safety, health, communication, time optimizing, and money saving
- Reliable elements from the market research on this PSS showing it will sell well

The business plan gathers all this information to convince investors. A venture capital investor or investment pool will provide funds to an enterprise on the basis of this business plan detailing the product, system, and service (PSS) and the background of the management group. At this very moment, the earliest stage at which a plan becomes operational, a startup is born. It is an “age zero firm.” Then, some projects reach the critical size and develop by themselves, others do not and fail. Why? The answer must be found in

the conditions of what is called now the “business model” (Chesbrough and Rosenbloom 2001).

Startup entrepreneurs do not come out from nowhere. They were incubated in some place and territory where they decided to do it their way. The transition from startup inspiration to creative incubation, before hatching out, deserves some reflection. Moreover, the consequences on job net creation by startups should catch more attention from the observers.

Startup Incubation: From Conventional Business Plan to Alternative Business Model

Enhancing entrepreneurship through public institutions in numerous fields appears as a new practice in the USA in the years 1960s, taking the shape of “business incubators.” In the USA, there are currently 1,200 of those centers, usually managed by universities, hosting 41,000 startup companies (NBIA 2011). The methods of “incubators” are now being benchmarked. Incubated companies know how to take advantage of finding in those institutions professional assistance and service providers to fulfill their business needs.

Institutional incubators help all kinds of projects to emerge in many sectors, not only in the Internet. The concept of startup companies appears later than the “incubators,” surprisingly enough heading for “accelerators,” nowadays. Among the incubated projects sustained by the institutions, some of them are featured for new technologies of information and communication, linked with electronic devices. Those PSS show intense responsiveness to customer’s wants. They give birth to the burgeoning home and desktop computer industry. By the end of the twentieth century, startup and “dotcoms” surge as new categories of economic phenomenon. The very places of their birth happen to be not necessarily in the “business incubators” which were set up through the USA, inside the universities and their campuses. The first shelter of startup companies would be well homes and garages. But modern economic history shows also many examples of

successful existing companies giving birth themselves to “spin-off” enterprises. Some significant startups appeared indeed in large privately owned enterprises. New entrepreneurs inside those companies define themselves against the dominant internal culture, by opposing current beliefs, expectations, and governance. These ambitious executives have new ideas for technological and economic alternatives but are getting frustrated with the lack of incentive felt in their professional environment. At the same time, they know – and even participate in – the building of a successful and well-established business model, thus acquiring experience. Hence, innovation comes as the result of applying well-known features issued from a successful model whose methods and forces are assimilated by the startup entrepreneur to a new venture of his own. The startup enterprise appears in an environment where some changes are to be introduced, according to the entrepreneur. If this is impossible, creating a startup with a new business plan, and soon a new business model, becomes the contradictory alternative solution. Most successful startups pivot to new decisions at least once from the ongoing business plan.

A good business incubator can be a firm rather than a public state-owned institution, that is, a place where the cold winds of competition stimulate instinct for survival of the securely employed executive, on one hand, and, on the other hand, stimulate as well appetite for fame and fortune of the nascent entrepreneur. Which of the contenders will come out on top in the struggle for innovation? Large companies tend to inhibit pivoting for their “internal startups.” An exception to the rule is presented with Xerox and the features of their governance.

Xerox 914: The Stem Cell of Startups Odyssey

The model 914 has no future in the office-copying-equipment market. It is too costly. This is a unanimous opinion shared by consultants (Arthur D. Little) and big companies (General Electric).

But on September 26, 1959, Xerox (ex-Haloid) brings the 914 to market by itself, surmounting the obstacles of high cost by using an innovative business model. Instead of selling the equipment, Xerox offers customers a lease. A customer needs only to pay \$95.00 per month to lease the machine, promising to pay 4 cents per copy beyond the first 2,000 copies each month. Xerox would provide all required service and support, and the lease could be cancelled on only 15 days notice.

It is successful. The actual consumption reaches rapidly 2,000 copies a day (not a month). The technology of electrophotography allows very high speed, and new models appear increasing faster and faster the number of photocopies swallowed by contemporary societies and paying fees to Xerox. Xerox’ revenue grows at an astonishing compound 41% rate for a dozen years, turning \$30 million Haloid Corporation (now Xerox) into a global enterprise with \$2.5 billion in revenues by 1972.

Meanwhile, in 1968, C. Peter McColough (1922–2006), who had led sales and marketing of the 914 against winds and tides at the beginning, is appointed chief executive of Xerox. As the growth of copier revenues begin to flatten at the end of the 1960s, McColough sets a new direction toward “the architecture of information.” His first steps toward realizing this vision is to enter the computer business in 1969 by establishing the Palo Alto Research Center (PARC) in 1970 to lead the way technologically for the future of desktop computing and startups Odyssey.

Three Business Models and a Failure

In the 1970s, many startups are created for the purpose of commercializing one or more technologies developed within the corporate research laboratories. Xerox is then acting willy-nilly as an incubator. Chesbrough and Rosenbloom (2001) identify 35 spin-off companies between 1979 and 2000 emanating from the corporate research laboratories of Xerox.

Three of those startups create significant economic value, and they do it mainly in opposition with the business entity they stem from, thus pivoting to an innovative business model.

3Com: Large Scale Sales Versus Selective Distribution

Robert Metcalfe (1946–) is hired in 1973 by PARC to promote a technology to link Xerox printers and workstations to DEC minicomputers. Spurred by Metcalfe's efforts, Digital, Intel, and Xerox form an alliance (DIX) to define a standard for Ethernet LAN communication and to promote its widespread adoption as an "open standard" by the computer industry. Armed with the DIX alliance, 3COM starts up seeking venture capital in order to begin developing hardware products in October 1980. The search pays off in February 1981, with first round funding of a million dollars from investors who look beyond the business plan and are attracted by Metcalfe's vision and charisma.

By 1982, the minicomputer market for Ethernet begins to take off.

3Com realizes much greater success in the IBM PC marketplace, selling Ethernet adapter cards to be installed in corporate networks running Novell's operating system. The core value proposition becomes the ability to share files and printers via an Ethernet also compatible with the nascent IBM PC standard.

Yet, Metcalfe continues to focus on the emerging desktop market, but Xerox does not follow him. He quits.

Metcalfe had originally expected 3COM to follow the Xerox-like business model of an integrated manufacturer with its own direct sales force, which is then the prevalent pattern in the industry. After leaving Xerox, however, he has compiled with his wife a directory of independent vendors of local area computer networks across the USA. From now on, 3Com distributes its products through independent resellers, giving up the idea of direct sales force distributing the products, systems, and services (PSS) to selected consumers.

Thus, the key ingredients in what emerged as the working definition of 3COM's business model stood in sharp contrast to the Xerox model of exploiting unique proprietary technologies through a direct sales system to a group of known customers. The latent value in the Ethernet technology really did not materialize until the technology was targeted at a different market, offering a different value proposition and utilizing an open technology platform, and sold through a new set of distribution channels.

Adobe: From Postscript to PDF

The spin-off of Adobe from Xerox follows a path similar to that of 3Com. Adobe's founders, Charles Geshke (1939–) and John Warnock (1940–), left PARC in 1983, after an argument with Robert Adams, then the head of Xerox's printing division, in order to commercialize a page description language that becomes their first product, PostScript. PostScript allows printers to use digital fonts to reproduce a wide variety of characters generated from a PC. Adobe Systems, Inc. went on to become a public company 4 years later and continues to operate as an independent company with a valuation exceeding \$12 billion in 2011.

The technology embodied in PostScript came from Interpress, a page description software developed at Xerox PARC. Interpress was an internal, proprietary protocol used to print fonts generated from Xerox workstations on Xerox printers. Warnock and Geschke argued with Adams over whether to make Interpress into an open standard, as Ethernet was then becoming. As Geschke remembers it, "Certainly, within Xerox, none of this was going to happen. They wanted to have an industry standard, but they wanted to control everything at the same time."

Adobe's initial business plan contains many elements that were similar to the model then dominant at Xerox, but subsequent events forced the founders to change it. As Geschke recalls:

Our original business plan was different. We were going to supply a turnkey systems solution including hardware, printers, software, etc. With this in hand, we were then going to build a turnkey publishing system. It turns out other people were trying

to do this at the same time – there would have been a lot of competition if we had gone this route. . . .

In many respects Steve Jobs (1955–2011) was key ingredient in getting things going the way they did. Steve came to us and said, “we don’t want your hardware, just sell us the software”. We said, “No!” Later Steve came back and said, “OK, then just license it to me”. That’s how the business plan formed. It wasn’t there in the beginning.

Then, selling font libraries to computer and printer office equipment manufacturers (OEM) like Apple and Hewlett-Packard requires very different resources to execute. Computer makers like Apple and IBM and printer makers like Canon and HP enter into a new value network. Together, they effectively create a new value proposition that enables the output of rich document types via desktop publishing and WYSIWYG graphics. They focus on supplying just the digital font libraries to laser printer and software manufacturers, which are made increasingly valuable by the impressive improvements in PCs, printers, and software. They compete through establishing PostScript as a de facto standard. As with 3Com, the business model that eventually creates significant economic value out of PostScript for Adobe differs greatly from the Xerox business model.

SynOptics: From Fiber to Copper

Andy Ludwick and Ron Schmidt leave PARC in 1985 to form a startup to commercialize PARC technology. SynOptics seeks to enable Ethernet technology to run over fiber optic cabling. The founders intend to develop the capability to deliver a complete network system: fiber optic cabling requires to run Ethernet over that faster medium. Their original business plan involves the creation of an extensive field installation and service organization, along with a direct sales force, like Xerox. But what gets the company off the ground, though, is discovery of the ability to run Ethernet communications at high speeds over already installed IBM token ring copper wires. Ron Schmidt has been experimenting with this capability just prior to leaving PARC, but it isn’t until after SynOptics is formed that its importance becomes evident. SynOptics soon abandons the fiber optic approach implied in its

name and focuses instead on running networks using its protocols and software on copper wiring already installed for IBM networks.

This allows SynOptics to avoid providing installation, field service, and support in its own part of the value chain (Xerox business model). Instead, they are relying on a network of resellers to distribute, service, and support the product. SynOptics makes customers’ copper wire more valuable and enables faster network transmissions. They save a great deal on installation costs. Despite intense competition that drives down prices, SynOptics’ annual revenue grows to a high of \$700 million in 1993. Thus, SynOptics’ eventual business model differed completely from Ludwick and Schmidt’s initial Xerox-like business plan.

Metaphor: An Unsuccessful Xerox Business Model

Metaphor is created by David Liddle and Donald Massaro in 1982. It develops a series of technologies that allow nontechnical users to create sophisticated queries of large data bases. This enables a new group of users to mine corporate data for a variety of new purposes, such as market research, pricing analyses, or analyzing possible new product features. Metaphor would let workers construct their own database queries to access corporate data directly in an intuitive fashion.

This is what Google does nowadays.

Metaphor’s ambitious technical approach is accompanied by a business model that would have been familiar to Xerox. It includes developing a proprietary software product and selling that software bundled in with proprietary hardware as a turnkey solution for its customers through Metaphor’s own direct sales force. Liddle defends this approach as the only viable means at the time to implement their product strategy:

The problem wasn’t one of a business model. When we started Metaphor, standards weren’t available and the only choice was to do the entire system – that’s the way every body did it then. It’s not like today. What’s more, this kind of product couldn’t be sold at a retail level. The only way to sell it was with a knowledgeable sales force. . . .

Similarly to Adobe's circumstances, at the time Warnock and Geschke leave PARC (not long after Liddle and Massaro left), there are no standards for fonts or generating computer characters mathematically on laser printers either. Nor is there an obvious way to distribute such a product. And Adobe's initial plans are to develop the entire system as well. The value network has to be constructed. Warnock and Geschke believe that, in hindsight, Adobe would not have succeeded, had they continued with their initial business plan. They also felt Metaphor import this approach as a direct result of their experience in Xerox. John Warnock remarks that "Metaphor took the Xerox business model. This may have been a mistake. Metaphor is not one of the great commercial successes spun out of PARC."

The company did manage to survive from 1982 until its sale in 1991 to IBM, but its financial performance is meager, and it burned through a great deal of venture capital.

The founders of Metaphor commercialize some promising user interface and database query concepts through a business model that is quite similar to the one at Xerox. They do not pivot to something else.

On the contrary, 3COM, Adobe, and SynOptics create value from Xerox technologies only after they transform their business plans substantially from the ones that Xerox usually validate.

3COM pivot to a distributor's network, Adobe pivot to a licensing policy, and SynOptics pivot to compatible hardware.

Hence, conducting a startup within a successful established firm is likely to be more highly motivating when alternative business models can be considered. It seems notable that among these examples, while some business model is implicit from the start, a different model hatches out by the time the successful ventures demonstrate their viability. This is where innovation begins and new jobs are created.

Startups and Job Growth

To recreate the organization that can be observed in the startups, in research as well as in

fund-raising, many sectors rationalize their structures by deploying small autonomous units. The takeoff of the Internet begets not only new valuable PSS but also the consciousness that without a specific business model, a "prototype" or "pilot" PSS remains issueless. Forty-five years after the creation of PARC by Xerox, the economy gives birth to startups in many sectors like pharmaceuticals, biotechnology, semiconductors, etc., offering widely diversified PSS. Particularly, there is a dynamic in firm birth that seems to be very important for understanding job creation – specifically, the unique effect of new firms, or startups: they have nothing to sell, yet, but hopes, but they do have workers to pay, not with "hopes," thus offering outlets to the markets in the meantime.

Job growth is driven, essentially entirely, by startup firms that develop organically.

Put simply, current observations in the USA show that without startups, there would be no net job growth in the US economy. This fact is true for almost all the years for which the United States has data going back to 1977 (10 years after PARC creation). By construction, the Business Dynamics Statistics (BDS), new data bank made publicly available in a variety of ways through the US government web site, defines an *existing firm* – age 1 up to age 26 and beyond – such that it can both create and lose jobs. In contrast, a *startup*, or age zero firm, only creates jobs because it experiences no gross job destruction. It could be anticipated that the net job gain also would be positive at existing firms. This would mean these ones would constantly hire more people than they would dismiss, but that is decisively not the case on the territory of the USA, during most years on record. Particularly, Table 1 below shows that, during a rather difficult year (2009), job creation at startups remains stable, while net job losses at existing firms are highly sensitive to the business cycle.

That means that all firms in a latter age group create just a fraction of jobs created by startups. For example, in 2005, startups created 3.5 million jobs, compared to the 355,000 gross jobs created that year by firms founded in 1995, which also lost 422,000 jobs that year. Indeed, existing firms

Startup, Table 1 Active establishments by firm age (USA 2009) and job creation

Age of firms	Number of firms	Share of employment	Share of job creation	Share of job destruction
Total	12,247,735	100%	100%	100%
Startups (age zero)	814,743	6%	16%	0%
1–5 years	3,025,057	23%	16%	20%
6–10 years	1,906,105	14%	9%	12%
11–20 years	2,441,063	19%	13%	17%
21 years and over	4,060,767	38%	46%	52%

Source: U.S. Census Bureau, Center for Economic Studies, “Business Dynamics Statistics” - (BDS)

in all year groups have gross job losses that are larger than gross job gains.

A closer analysis indicates net job growth in the United States comes from firms less than *one* year old, formally defined as startups (Kane 2010).

Conclusions and Further Directions

Startups, defined as less than 1 year old or zero age firms, appear to generate net job growth in the United States. Aggregating net job creation of existing firms ages beyond one shows few or no net job creation compared with job destruction. If existing firms happen to lose jobs in the territories where they operate, it seems that compensation can only be found in increasing the rate of birth of new firms. The products, systems, and services (PSS) involved in those creations develop as the needs for consumption and production goods arise, offering one another the outlets justifying job creation. As a matter of fact, startups appear now in a globalized economy, creating jobs in territories totally different from the places where existing firms used to run their activities. New opportunities are surging up in emerging sectors and territories where business plans and business models apply not only to production and sales but also to innovative research. So that job creation by startups compensates job losses by existing firms on different territories and economic areas. Seed capital used for financing projects during their startup phase, and before sales reach the break-even point, should provision against compensation adjustment delays in the field of employment.

With a specific tool of measuring this effect of new net job creation of entrepreneurship in contemporary economies, policymakers should appreciate more accurately the life cycle of job growth.

In other words, promoting employment growth must include a central consideration for startup firms and the places, territories, and areas to hatch them out.

Cross-References

- ▶ [Business Incubator](#)
- ▶ [Business Model](#)
- ▶ [Business Start-Up: From Emergence to Development](#)
- ▶ [Entrepreneurship Policies](#)
- ▶ [Heroic Entrepreneur, Theories](#)
- ▶ [Partnerships and Entrepreneurship \(Vol Entrepreneurship\)](#)
- ▶ [Psychological Aspects of Entrepreneurial Dynamics](#)
- ▶ [Socialized Entrepreneur, Theories](#)
- ▶ [Spin-off](#)

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Start-Up

- ▶ [Innovation Opportunities and Business Start-up](#)
- ▶ [Microfirms](#)

Start-Up and Proximity Relations

- ▶ [Innovative Milieu as a Driving Force of Innovative Entrepreneurship](#)

Start-Up and Small Business Life

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Synonyms

[Entrepreneurial firm](#); [New companies in innovative sectors](#); [Setting up a venture](#); [Small business operation](#)

Key Concepts and Definition of Terms

Start-ups refer to a specific form of entrepreneurial business: these are new, small ventures in their early stages operating mainly in sectors with the

highest level of cutting-edge innovation and technology. They generate a competitive advantage by carrying out their operation with small, highly specialized, creative teams. Start-ups are regarded as possessing the “genome” that accelerates innovation, inventions, and risk-taking. Consequently, start-ups are viewed as highly dynamic, growth-oriented, profit-driven, and determined to introduce value.

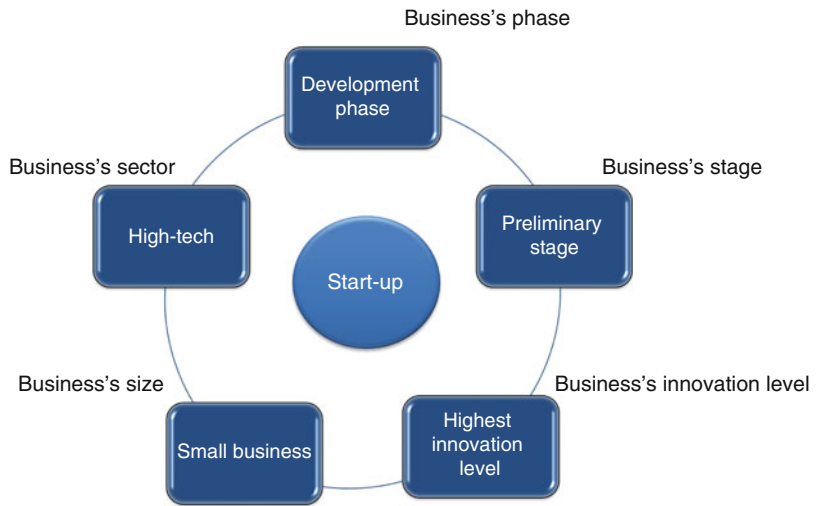
Start-ups are regarded in the entrepreneurship research as a multifaceted but vague concept, consisting of an interaction of sequential measures (e.g., introducing innovative ideas, exploiting opportunities, using cutting-edge technologies for implementation, gathering highly expert teams) that are embedded in the external and internal environments’ culture, technology, and infrastructures. These measures are then echoed in the start-up’s structure, processes, and daily life, as presented in [Fig. 1](#).

Small start-ups (SSUs) are deemed a promising track to personal financial success and thus have become a buzzword in public debate and research. At the macro level, SSUs have been recognized as a major vehicle for regional and economic growth via their introduction of innovation, originality, and a higher number of patents into the region. Consequently, they create new jobs for professionals and experts, as well as jobs that stimulate innovation and use of advanced technology; they are facilitators of upward social mobility, and they foster innovation in the region. At the micro level, SSUs are considered primary enablers of wealth generation and promotion of one’s expertise and a platform for “born-global” companies. Thus start-ups are sound and highly regarded. Concurrently, SSUs are known to experience higher rates of discontinuation and failure.

The constant churning activity of SSU setups and closures, recognized in most countries in terms of start-ups’ stimulating success stories (e.g., Apple, Google, Facebook), creates an atmosphere in which setting up a SSU seems risky and uncertain, yet at the same time promising and thrilling. Research consistently shows that youth aspire to establishing start-ups in the future.

Start-Up and Small Business Life,

Fig. 1 Distinctive components of SSUs



The probability of SSU success relies on a number of entrepreneurial pillars, e.g., the entrepreneur’s personal competencies, the presence of lucrative opportunities, generation of resources, and partnerships, coupled with a higher degree of innovation, newness, and expertise compared to traditional industry.

However, the SSU’s dependence on the highest levels of innovation may yield two different situations: lacking the levels of resources, experience, networks, recognition, and legitimacy in the marketplace enjoyed by more established and larger firms is a critical disadvantage for SSUs in generating the required resources to best fit the customers’ needs and in building new assets on an ongoing basis to produce a sustainable competitive advantage. As such, their preliminary advantage, i.e., developing innovation, may eventually be counterproductive and even result in their own discontinuation. The second situation involves the SSU’s flexible and adjustable internal structures and processes, which are the outcome of its size, business phase, and stage. Thus, relative to established and larger firms, SSUs are less constrained by internal routines and may use more adaptive capabilities and may therefore more rapidly adapt to new conditions. This leads to the use of strategies and practices that can more easily engender innovation and competitive advantages (Reynolds 2000).

Theoretical Background and Open-Ended Issues

The theories and models that have been most widely used in explaining the scientific principles of SSUs are based mainly on human capital (Becker 1993), capabilities models: the resource-based view (Barney 1991) and the dynamic capabilities model (Eisenhardt and Martin 2000), and knowledge-based models (Eisenhardt and Santos 2002; Teece 2000).

Human Capital

According to the human capital (HC) theory, factors such as education, prior entrepreneurial experience, training, managerial know-how, and some other attainable factors are relevant to the emergence and success of SSUs; entrepreneurs possessing a higher quality of human capital will have a superior ability to successfully exploit opportunities, be better able to judge, or even create, potential opportunities, and be better networked, informed, and more proficient in using their teams’ knowledge to more effectively manage their ventures.

The HC theory asserts that the quality of the human capital blend in the business delivers both *functional* capabilities that assist in

commercializing the products/services and *adjustment* capabilities that enable altering internal capabilities in accordance with environmental changes, e.g., technological advances, introduction of cutting-edge knowledge, and the constant emergence of sophisticated competitors. Thus, SSUs can only succeed by employing a range of expertise and a high quality of professional human capital, hinged around knowledge and embedded within the business teams, processes, and structures.

SSU entrepreneurs often find it difficult to enact the full range of managerial and organizational capabilities necessary to lead a new business toward success due to their specific expertise which is mostly in professional-technological areas; this, coupled with the demand for businesses to continually innovate, requires a range of up-to-date human capital characteristics that are readily available or embodied in the teams, e.g., management, marketing, strategic collaboration, and funding. Because such characteristics may be lacking in SSU entrepreneurs, they should be appropriated and integrated from the outside in order to sustain the business (Shaver et al. 2001).

Resource-Based View

The resource-based view (RBV) is regarded as a robust theoretical framework that enables determining a venture's performance by exploring and understanding its business resources and subsequently, its value. The RBV was initially promoted by Penrose and later expanded by other scholars. The RBV stresses that new ventures accrue their internal resources in order to generate a competitive advantage in the market, hence will look for resources that can either provide the business with a competitive advantage (e.g., SSUs that recruit well-known scientists, receiving a prestigious grant) or produce outcomes that can provide a competitive advantage (e.g., a developed technology that enables creating a new product/service, approved investment endowments that enable upscaling). Resources are regarded by the RBV as objective,

heterogeneous entities. Accordingly, the venture's stock of resources may include financial, human, physical, and technological resources, which may be either tangible (e.g., machinery, employees, remedies) or intangible (e.g., culture, social capital, expertise). The main essence of "resources" according to the RBV is that they will be exploited and used in the SSU only when identified as adding significant value to the venture. The RBV espouses the concept of VRIN, which refers to *valuable, rare, imperfectly imitable, and nonsubstitutable* resources, thus encompassing a significant source of competitive advantage.

In sectors that stimulate SSUs, where innovation and development are salient, the blend of resource combinations can add value to the business; VRIN resources which are strongly embedded in the business' technology, processes, and team expertise, as well as in some latent resources such as culture, robust leadership, or social capital, may be most valuable in breeding the business' competitive advantages. The relevance of the RBV to SSUs is echoed in the multitude of studies published on the relationship between Schumpeterian views of innovation and RBV.

As already mentioned, the unique context that nurtures SSUs, i.e., uncertainty, technological challenges, time to market, and a constant lack of tangible assets versus the venture's essential need to develop technology and acquire the best expertise, as well as machinery, equipment, and premises, among others, requires SSUs to identify innovation in their own businesses, export it from the outside, or create VRIN resources to sustain their competitive advantage. In this sense, the HC theory is useful, particularly when coupled with the RBV, in explaining SSU performance and success, by using high-quality and best-fitting human capital and developing it into VRIN resources that allow generating a competitive advantage.

Networks – The growth in popularity and business-related use of virtual network platforms, e.g., Facebook and Twitter, emphasizes the power of the venture's networks and social capital as VRIN resources, which can produce sustainable competitive advantages. Particularly in

innovative sectors exporting the most fitting expertise, ideas, knowledge, and technologies, it is the core of potential success. Commercializing the novelty requires another specialized conduit that networks might fill via more efficient channels. Drawing upon the RBV concepts, SSU resources can deliver, mobilize, or create new key capabilities via networks and facilitate the SSU's activity and success.

Several social network theories may be relevant to understanding the successes and failures of start-ups. The notion of strong and weak information ties recognizes the premise that the value of information transmissions depends on the quality of the links, the people that the entrepreneur is linked to, and the type of information received (Adler and Kwon 2002). The implication of these theories to SSUs involves their dependence on key factors, such as the most up-to-date knowledge, information, and technological advances, which are critical to their survival and success. As these key factors are asymmetrically distributed, i.e., within laboratories, governmental bodies, academic publications, etc., virtual networks can greatly ease the search and their implementation.

Dynamic Capabilities Theory

The dynamic capabilities (DC) perspective, which emerged from the RBV, adds a vigorous, dynamic outlook on SSU strategies and success levels. The DC perspective conceives of start-ups as vigorously altering their internal resources to generate sustainable competitive advantages by reconfiguring their resources, capabilities, and expertise to adapt to the dynamic, changing environment. The RBV has been criticized by some researchers as considering competitive advantage from a static rather than dynamic approach, even though new ventures animatedly exploit opportunities and later their resources within dynamic markets. The DC perspective regards the new venture as being in a continual process of developing innovative responses to adjust to the dynamic, changing environment. Resources are viewed as asset positions that can be deployed

creatively in order to shape opportunities; subsequently, innovation and technologies are deemed a “must” in developing new capabilities and avoiding the problem of “core rigidities.” Such valuable asset positions depend on the entrepreneurial team's ability to identify and respond in a timely fashion to the dynamic challenges posed by the environment. The new venture's competitive advantage is thus determined by its dynamic capabilities. Here too, the relevance of the HC theory is strengthened, as human capital that is developed and blended in with the SSU's assets creates higher competitive advantages. While a blend of human capabilities is a necessity for SSU success, it may hold some risks and have unfavorable outcomes that can destroy valuable extant capabilities (Teece 2000; Zahra et al. 2000).

As the focus of the DC theory is response to changing environments, its implications for SSUs are vital: in essence, the DC perspective postulates that the venture's capabilities will be valuable only when they are constantly dynamic and adjustable to the environment's rapidly changing demands. As such, the DC perspective emphasizes the processes rather than “just” obtaining VRIN-based resources and can illustrate the dynamic changes in the SSU through its concepts.

Bricolage – Drawing on the conceptualization of bricolage: “making do by applying combinations of resources at hand to new problems and opportunities,” this model may facilitate our understanding of the flexible and innovative adaptation of SSUs' available resources. The bricolage model suggests that any resource can be redefined by enacting alternative practices and routines; accordingly, SSU entrepreneurs often use and alter physical, social, or institutional resources that are disregarded by the more established firms, thus introducing creative and original resources that create a significant competitive advantage. In their endeavor to attract qualified expertise and enhance innovation, SSU entrepreneurs may draw on their experience from existing business relationships, prior employment, private networks, etc., to access information, knowledge, and opportunities and promote their dynamic capabilities and business resources (Zahra et al. 2000).

Knowledge-Based Theories

The knowledge-based view (KBV) contends that knowledge is the firm's most valuable resource, as it is a VRIN resource that can be altered and adjusted, providing a major source for sustainable competitive advantage. Traditionally, the KBV has been considered an extended perspective of the RBV, i.e., a most valuable generic VRIN resource, a most difficult asset to imitate that generates a sustainable competitive advantage. Knowledge was considered to be relatively immobile and molded through the business' stock of resources. However newer views of knowledge, reflecting the rapidly changing environment, highlight the notion that superior business performance can be reached by continuously creating temporary competitive advantages; these can be achieved by altering resources and adjusting them to the market's changes (Eisenhardt and Santos 2002; McEvily and Chakravarthy 2002; Eisenhardt and Martin 2000), thus emphasizing the dynamic nature of knowledge. As such, the KBV can be viewed as embedded in the DC perspective, as knowledge creation is a crucial dimension in forming the start-up's intellectual capital and dynamic capabilities.

The SSU's stock of knowledge is an intangible resource embedded in and mobilized across the different business processes, e.g., teams' expertise, the business' systems, the business' culture, among others, depending on the focus attributed to knowledge in the business' success. Information technologies can play an important role in the KBV of the firm in that information systems can be used to produce, enhance, and accelerate large-scale intra- and interfirm knowledge management.

Knowledge can be transferred as know-what, and know-how may therefore be replicated and combined with the SSU's existing knowledge to create superior, sophisticated knowledge of the business. Knowledge transfer is promoted by people because it is possessed by individuals, yet when transferred, it is shaped by the business' context. Accordingly, it reflects the business' use of this knowledge. While knowledge transfer is

potentially risky because it can disclose the business' technologies and practices, knowledge is voluntarily shared and exported by SSUs and individuals, as the benefits are thought to outweigh the risks. Nevertheless, to deter risk, SSUs import knowledge and then recombine it with their existing knowledge and mold into their existing structure. As such, imported knowledge can contribute to SSUs without putting the businesses that exported it at risk; eventually, application of this knowledge will take on different forms. Porter (1990) pointed out that knowledge and its derivatives may engender rivalry, which is a powerful stimulus for SSUs toward enhancing the creation of new knowledge to sustain their competitive advantage, making knowledge a vibrant source for development and improvement.

SSU Characteristics

The broad dimensions of entrepreneurship and SSU research are presented in Table 1. Due to the dynamic nature of SSUs and their environments, different dimensions are constantly being identified as being associated with SSU structure, processes, and outcomes.

The environment – SSUs exist in a complex environment with a constantly accelerating pace of change and the demand for the “next promising exit” as a driving force. Drawing on Schumpeter's views, innovation, development, and technological advances are essential sources of any firm's economic growth. Accordingly, environments encompassing characteristics associated with innovation (e.g., environments that produce leapfrogging, high-tech areas, developing regions in which the first national priority is development and innovation) stimulate the emergence of new SSUs. SSUs, however, are highly vulnerable to any change in the environment, in particular advances in technology and innovation. In any environment, SSUs encounter established companies that are attempting to slow down and minimize the potential competition from the newly born SSU. SSUs react by (a) accelerating and scaling up their activity to create a competitive advantage over the existing companies; (b) proposing collaborations with the

Start-Up and Small Business Life, Table 1 Leading dimensions associated with the life of a start-up

The entrepreneur	Local environment	Global environment	Business structure and processes
Personal traits – entrepreneurial competencies and capabilities, risk-taking, proactivity	Localized knowledge; dynamics of technology-intensive sectors	Technology development: global technological dynamics, knowledge-based environment, emergence of cutting-edge developments, emergence and popularity of internet, e-commerce, and e-businesses	Innovation, embedded in the business’ structure and processes
Entrepreneurial expertise and knowledge	Knowledge stock and knowledge centrality: innovation and expertise that originate from a region and is developed in the same region	Lucrative opportunities: existence and feasibility of lucrative global opportunities; collaborations and bilateral agreements	The business demographics, business team
Entrepreneurial intentions, aspirations, and motivations	Knowledge diversification: production of new knowledge from the existing regional knowledge	Global economic state: customers’ ability to purchase innovative products/services; investors’ ability to invest in cutting-edge products	Investments and strategic collaborations
	Lucrative regional opportunities and regional resources	Contextual factors: factors in the global arena affecting the setup of global, knowledge-based start-ups, e.g., bilateral relationships, politics, economics, international law, cultural approaches to innovation, and collaborations with academia	Financing: fund-raising and investment management
	Contextual factors in the local environment		Strategies used
	Cultural approach toward start-ups		Networking
	Local infrastructure and support systems		Business growth and success
			Business difficulties and failure

existing companies, e.g., mergers and acquisitions; or (c) accepting the balance of power in the market and discontinuing their activity. As a result, innovation can be at risk. By choosing model (a), SSUs experience rapid growth which is frequently coupled with embracing the more traditional rather than innovative routines associated with larger firms’ operations; model (b) may push SSUs to become assimilated within the larger firms, hence accepting their ongoing culture, processes, and structures; model (c) refers to ending the business.

The growth rate of SSUs is systematically and positively associated with the environment:

countries experiencing a greater role for entrepreneurial activity and higher rates of subsequent growth cultivate more successful start-ups and vice versa. A potential implication is that countries which have a greater share of start-ups and encourage the setting up of SSUs are rewarded in terms of economic growth (Thurik et al. 2008).

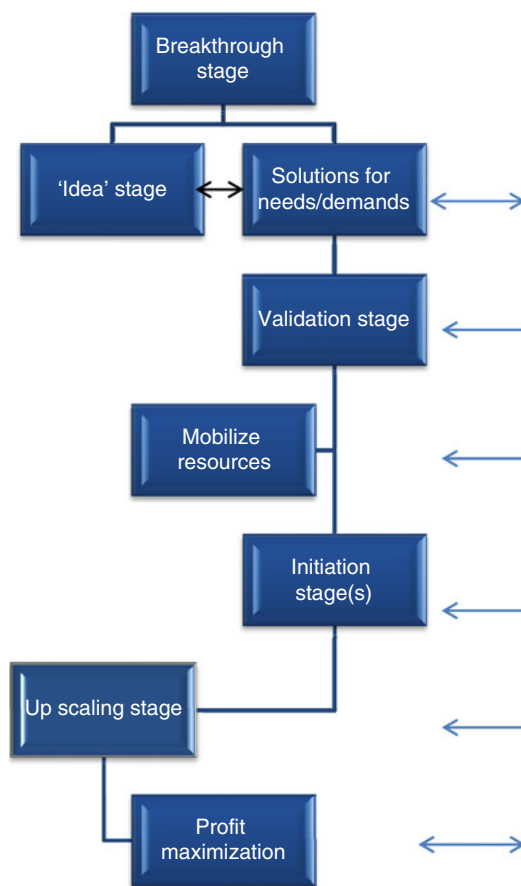
Types of start-ups – SSUs capture value by creating a competitive advantage. Many SSUs introduce innovation or innovative technology, manifested in two basic ways: (a) process-based: incorporating innovation/innovative technology within their current operation to foster efficiency, shorten research and development (R&D)

and production processes, and reduce organizational costs; (b) outcome-based: developing new products or launching new ventures that exploit the introduced innovation/innovative technology for new markets or in new arenas by introducing new products/services to the market.

Despite these differences, all SSUs consider innovation an imperative asset. They take innovation to the market through a process implicitly embodied in their overall course of action. While innovation may remain latent to the market until it is commercialized, it is a significant component that is reflected in each of the business' dimensions.

The business focus of SSUs leads to different business types, identified as: (a) laboratory SSUs, which focus on patent development and on rigorous R&D activity, such as academic spin-offs and pharmaceutical start-ups; (b) product-centric SSUs focused on self-acquisition of customers, such as Google, Dropbox, Eventbrite, and SlideShare; (c) SSUs focused on self-service customer acquisition that target critical mass and are based on new ways for people to network, e.g., Facebook, Twitter, YouTube, PayPal, Quora, and eBay; (d) SSUs that rebuild other companies' innovations for smaller enterprises, e.g., PBworks, UserVoice, Mixpanel, Dimdim, and HubSpot; (e) SSUs focused on sales with high customer dependency and lower certainty, such as Oracle, Cloudera, Splunk, Salesforce, BazaarVoice, and MySQL. Each of these types engenders specific expertise, knowledge, business structures, and processes. The levels of innovation and the consequent allocation of capital for R&D and technological advances are tightly associated with the SSU's culture and the significance it assigns to innovation.

Stages of SSU development – SSUs are regarded as evolving in unique and specific stages which reflect their innovation. Of the various models promoted in this research area, the following representative stages emerge (summarized in Fig. 2): (a) the breakthrough stage, referring to a start-up's identification of a meaningful need; (b) the idea stage, in which the entrepreneur/team provide solutions to meet the identified need; (c) the validation stage, in



Start-Up and Small Business Life, Fig. 2 Stages of SSU development

which start-ups look for early validation to ensure that the shareholders are interested in their future solutions by seeking seed funding and recruiting key experts to implement their ideas; (d) the initiation stage (this phase may involve several stages): the business model and value proposition may be refined and improved, then resources may be mobilized, a repeatable sales process and scalable customer acquisition channels may be sought, and activity may be adjusted to competitor activity; (e) the scaling stage – start-ups strive to grow and therefore seek funding and engage in more formal organizational structures while still perpetuating their team's creativity and enthusiasm; and (f) profit maximization – this stage often involves strategic collaborations, internationalization, and introduction of more sophisticated

innovation. Many start-ups endeavor to combine internal mechanisms that nurture constant innovation with a more structured organizational composition that will appeal to their shareholders. Relying on their inherently higher levels of tolerance to uncertainty and ambiguity, start-ups pursue knowledge-based, competitive environments, as well as enabling their creation.

Linking academia and practice – The demand imposed on academic institutions to unearth innovation and technological advances, as well as to become more attractive to their shareholders, often leads to collaborations with local SSUs in which university licensing strategies and university incentives and licensing revenues are introduced. Such links benefit both sides: the SSUs may benefit by promoting their R&D and disseminating their advances through academic routes, while “star” faculty members can commercialize their laboratory inventions through SSUs.

SSU difficulties – SSUs face difficulties in both setting up and sustaining their businesses due to the rapidly changing and competitive environment, the dynamic nature of technological advances and the nature of their business’ processes, which are part of their daily routine.

In the first stages, SSUs are typically resource-deficient and may tackle difficulties related to uncertainty regarding the market’s acceptance of their introduced innovations, the technological feasibility of developing the planned product/service, the team’s expertise and ability to meet the demanding R&D deadlines, or outcome quality. Moreover, competitors may capture the targeted customers for the same products/services; the resources which are then needed to differentiate the SSU’s products/services from those introduced by the competitors or alternatively, to target the original products/services to other groups of customers, may be uneconomical and may even push SSUs to discontinuation. Governmental regulations and support (e.g., funding, technological commercialization, transfer, and investments), which are prominent factors in an SSU’s survival and prospective success, can be inappropriate for some SSUs’ needs.

SSUs that develop high-technology products may also be faced with particular difficulties linked with their own innovation; e.g., their applications may be unclear, the markets may not yet be prepared or mature enough for the innovation, and the innovative products may be obscure for the customers who find it difficult to link their needs and the developed product (van Gelderen et al. 2011).

Table 1 presents the dimensions that are most often discussed in research.

Conclusion and Implications

Studies on SSUs have been sweeping through the field of entrepreneurship; the last decade has witnessed widespread research into SSU life cycles, mainly due to the emergence of the internet. These trends have resulted in the prevalence of SSUs, shifting the balance of power away from established companies to the small, innovation-based businesses, which can generate cheaper innovation, are much more adaptable, and can use creativity and flexibility to adjust their offerings to the market’s changing demands.

As such, SSUs have become popular, constituting an employment track that is highly aspired to in the market, as it has been associated with a successful, wealthy, and fulfilling life. Nevertheless, research has revealed that the rates of SSU failure are high and that the lives of SSUs are fueled with uncertainty and risk.

Drawing on the theoretical models introduced in this chapter, emphasizing their unique capabilities, mainly human capital and knowledge, to differentiate themselves from existing firms, and coping with the market’s dynamic which tends to push new businesses out, SSUs identify and mobilize their capabilities and resources to use their size advantage and reach sustainable competitive advantages.

The main implication of this chapter is for the educational system and academic institutions: while SSUs are deemed an ideal employment track, the relevant capabilities to evolve into a successful SSU entrepreneur are outside the scope of traditional schools’ and academic institutions’ focus. Alternatively, educational institutions

emphasize the establishment of students' professional and scientific knowledge and neglect to cover entrepreneurial know-how, such as thinking creatively and originally, taking risks, being proactive, and being able to express innovative ideas in a clear and focused presentation, among others, which can be seen as the platform for innovation and advancement. Educational and academic institutions introduce knowledge and information yet lag behind in introducing those capabilities that can promote entrepreneurship. By fostering and supporting innovation in the culture, format and processes at the school, and higher academic levels, younger generations will obtain the relevant spirit and know-how relevant to the SSU life cycle and promote SSU success levels worldwide.

Cross-References

- ▶ [Business Start-Up: From Emergence to Development](#)
- ▶ [Innovation Opportunities and Business Start-Up](#)
- ▶ [Knowledge Capital and Small Businesses](#)
- ▶ [Small Business](#)
- ▶ [Small Businesses and Sustainable Development](#)
- ▶ [Start-Up](#)
- ▶ [Techno-Globalization and Innovation](#)

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Start-Ups in Services

- ▶ [New Forms of Entrepreneurship in a Sustainable Knowledge-Based Service Economy](#)

State Space

- ▶ [State Space Paradox of Computational Research in Creativity](#)

State Space Paradox

- ▶ [State Space Paradox of Computational Research in Creativity](#)

State Space Paradox of Computational Research in Creativity

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Synonyms

[Artificial intelligence](#); [Case-based reasoning](#); [Closed system](#); [Data mining](#); [Emergent shapes](#); [Generative algorithms](#); [Genotype](#); [Open system](#);

[Petri nets](#); [Rule-based expert systems](#); [Shape grammars](#); [State space](#); [State space paradox](#); [Sudden mental insight](#)

Computational Research in Creativity

It is an often used adage that humans are fundamentally curious and creative. Yet, some take issue with the implication that creativity is innate and argue that one gains power over goals through knowledge, whether they are related to creativity or not. This makes a case for a pragmatic view of how to explore, inquire, and research: “the human condition can be improved through understanding.” Ultimately, all explanations of human drive to achieve novelty are based on the tautological notion that creativity and curiosity have value. Regardless of the motivations underlying it, understanding phenomenon will eventually turn out to be important. Through such understanding, humans recognize, describe, emulate, and control external (i.e., global climate) as well as internal (i.e., human psyche) phenomenon.

Sudden Mental Insight: A Form of Creativity

One of the widely recognized and studied forms of creative behavior is the one called the sudden mental insight (SMI). This phenomenon has received considerable coverage in creativity literature (Hayes 1981). SMI refers to the sudden onset of a realization that makes the solution of a very difficult problem or the creation of a remarkable result possible. Hayes (1981) argues that SMIs can be explained through already known cognitive functions. Others have shown how the creative “leap” is akin to bridge building between the problem and solution domains which are normally separated by a chasm, and described the mechanics of the SMI in the context of several design and problem solving protocols. While, to date, important issues remain unresolved and un-researched, SMI is one of the few, known, overt signs of creativity (see ► [Creativity in Puzzles, Inventions, and Designs: Sudden Mental Insight Phenomenon](#)).

Creativity and Computation

In the age of information technology (IT), it is rare that any topic should be untouched by tools and concepts of computation. It turns out that creativity is one of the earliest IT goals addressed by techno-savvy folks of all kinds and backgrounds. It is no wonder that artist Harold Cohen has been painting with brush as well as *Aaron*, his digital counterpart, for more than three decades (Holtzman 1994). Cohen’s motivation for building the digital painter *Aaron* was for the same reasons as those provided in the introduction to this essay: curiosity and the impulse to do something new, which happens to be a curiously circular explanation. In the early years, *Aaron* was an automaton following instructions given to it through “rules,” a common device used in most artificial intelligence (AI) applications. Soon, Cohen realized that *Aaron* was no match for a human painter, like himself, principally because it did not learn from its experiences. Upon the urging of Edward Feigenbaum, who is considered to be one of the fathers of AI, Cohen decided to write some rules into *Aaron* about color theory. Then, *Aaron* started using color, which elicited the “wow!” or the SMI response from Cohen himself. He asks, “How did it come up with that?” providing a living example of how computer systems can behave in ways that are surprisingly human. Obviously, such personal impressions alone cannot be the measure for machine intelligence.

Alan Turing presented a test for machine intelligence through a succinct description. “I propose to consider the question, ‘Can machines think?’” or “Are there imaginable digital computers which would do well in the imitation game?” (Turing 1950). Ultimately, this sort of thinking led to the following tangible proposition: “*It is not difficult to devise a paper machine which will play a not very bad game of chess. Now get three men as subjects for the experiment. A, B and C. A and C are to be rather poor chess players, B is the operator who works the paper machine. . . . Two rooms are used with some arrangement for communicating moves, and a game is played between C and either A or the paper machine. C may find it quite difficult to tell which he is playing*”

(Turing 1950). Hence, the general principle that if one is unable to distinguish between a digital agent and a human by observing only their behavior – whether playing chess or reciting poetry – then the digital agent must be considered as capable as its human counterpart. Yet, Harold Cohen, like so many other users of digital assistants in creative tasks, considers these tools inferior because they can neither act in novel ways on their own volition nor learn from their actions.

Eve Sussman created a program with the help of Jeff Garneau, called the “Serendipity Machine,” that makes real-time splices of a set of video and audio recordings, based on a predefined, index-matching schema. As the permutations of audio-video pairings are spliced end-to-end, the result turns out to be quite startling if not delightful. Yet, Sussman is unwilling to call the Serendipity Machine a “creative companion.” Professor Selmer Bringsjord of Rensselaer Polytechnic Institute believes that mystifying the creator of the digital system is the least a creativity system should do; otherwise, he concludes that “we will keep cloning our own intelligence.”

Brigham Young University scientists have built a system called Darcy that judges art works. Darcy has elicited curiosity among humans, yet upon learning that its judgment is based solely on a preference for “red, bloody, and violent,” one’s enthusiasm wanes. There are many digital emulators of human activities but lack the litmus test for what is sufficiently creative or intelligent. Bringsjord brings this idea home when he remarks “Martha Stewart is credited with being creative when she recommends that we should use brown napkins with a yellow table cloth.” Up to now, the Turing test is the best thing anyone has come up with; yet, even that would not be able to show that airplanes are not as capable as birds, even though they can outfly, outdistance, and out-cargo birds.

Computer Assistance in Creativity

Computer-based research on creativity, even from the beginning, has focused on

a combination of the procedural and representational paradigms. Digital system models of creativity, on the other hand, build models through a singular feature, either representational or procedural, but not both. Procedural approaches include (1) rule-based expert systems, (2) case-based reasoning systems, and (3) complex generative algorithms (such as genetic, annealing, neural nets), while representational ones include (1) shape emergence, (2) object-based representation, and (3) complex recognition systems (data mining, Petri nets).

Procedural Approaches

All software, regardless of its primary functionality must operate within a representation. Expert systems tend to use the rewrite-rule formalism for this purpose. Case-based reasoning approaches match, retrieve, and adapt cases to create new solutions. Genetic algorithms rely on the representation of complex symbolic strings called *genotypes* that can map into complex objects. Mimicking the lateral inhibitions that take place between the ganglia during synaptic activity in the cerebral cortex, neural nets are representations that are built in order to create lateral relations between the nodes of a network. While representation is important, essentially, these approaches are built to provide procedurally defined approaches to machine intelligence. Representations are there merely to facilitate the procedural objectives by enabling genetic mutations, rule firings, case adaptations, or the neural-net derivations that can achieve creative solutions (Table 1).

Several researchers have explored the potential of genetic algorithms in design. Often, the design domain is represented as a collection of rules. The mutation of these rules holds great promise in effecting change in design search space. Using a search metaphor to explore the design space and their genetic metamorphosis illustrates the power of such approaches. Difficulty, however, exists in the predictability of the results based on the modifications made in the rules.

Rule-based representations have given rise to the conjecture that design can be achieved

State Space Paradox of Computational Research in Creativity, Table 1 Procedural systems for design creativity (Source: Akin et al. 2012)

Systems	Procedural schema	Representation schema
Rule-based	Apply rewrite rules that have their left-hand side match problem representation	Problem parameter variables; rewrite rules; strategy for rule application
Genetic algorithms	Use meta-rules to mutate rewrite rules; generate solutions	Problem parameter variables; rewrite rules; rule application strategy; rule mutation mechanism
Case-based	Match case; retrieve case; adapt case	Case representation; case-based

State Space Paradox of Computational Research in Creativity, Table 2 Representational systems for design creativity (Source: Akin et al. 2012)

Systems	Representation schema	Procedural schema
Shape emergence and grammars	Geometric primitives; maximal shapes	Combinatorial enumeration
Cognitive schema	Object-based representation of functional, behavioral, and physical characteristics	Formal reasoning; heuristic reasoning
Recognition algorithms – data mining, Petri nets	Large data bases; process models	Pattern recognition; heuristic search; abstraction

through the application of predetermined rules of geometric composition. The potential of the approach has been amply demonstrated by many who have created design spaces after well known, often historical sets and styles of designs: Palladian plans, Ire-Ray windows, and Queen Anne houses. A counterintuitive but promising result that has emerged from the early work in this area is that the grammar formalism often goes far beyond the original set of patterns and designs that give rise to the grammar, in the first place.

Maher’s work on case-based engineering design demonstrates how precedents can be used to create paths of evolution for new designs starting from existing ones (Maher et al. 1995). Some may argue that creative solutions should not be based on precedents or cases. Others argue that all designs, novel or routine, are based on earlier examples. In the end, the adaptation functionality that transforms the case into a solution makes it possible to reach a nonroutine, if not novel, design. In summary, the creative process envisioned by these systems requires that the problem being solved be represented in terms dictated by the procedural algorithm.

Representational Approaches

Because it is versatile enough to be regarded a representational approach as well, shape

grammars has been an important area of investigation in design creativity (Table 2). This is largely due to their potential to recognize *emergent* shapes (Stiny 2007). In some cases, creativity is attributed to the ability of the designer to detect patterns that are not evident but are “evolving.” The quality of a design then is affected by these points of SMI that a designer recognizes as she is navigating in a *space of design solutions*.

Others argue that in order to represent the process of creativity, a more complex representational schema is needed, including functions, behaviors, and structures to be embedded in new designs (Coyn and Subrahmanian 1993). This goes back to the early schema-based linguistic representations of memory and more recent applications in object-based software engineering approaches that have also been applied in architectural design. While these approaches also have great potential in capturing nontrivial aspects of architectural design, their claim of creativity has not been demonstrated (Rosenman and Gero 1993).

In very complex design space networks, Petri nets, and colored Petri nets in particular, can abstract general patterns that are not evident to the naked eye. These applications are most useful in representing complex procedural domains, such as VLSI design or large system design problems in chemical plants. Through these



applications, it is possible to control and predict overall performance in designed systems, including error detection and recovery, time of completion, and cost of delivery.

Data mining, a complex pattern recognition algorithm, is even more general in its purposes. It allows the user to discern patterns in unorganized data or data organized for purposes other than the ones currently at hand. Through this it is possible to identify relevant design requirements or select among many alternative solutions the ones that are most likely to yield creative solutions.

Environments for Integrating Representations and Procedures

Computational environments created to support mixing and matching of representation with procedure formalisms can provide support for design creativity. The ingredients necessary for such integration are extremely demanding. Table 3 shows an illustrative scenario in which many representations and procedures can be used in tandem to reach creative solutions to a design problem. In such a scenario, the designer starts with an object-based representation, which allows her to reason about the overall behavior of the object to be designed, its functional characteristics, and its structure. The design proposal emerging from this can be used to search a case-base of legacy designs to see if similar solutions have been developed in the past and if the present solution can be improved using their features. Here, the designer may observe that a shape-grammatical order is evident. In that case, the shape grammar formalism can be used to detect pattern emergence, and genetic algorithms can be used to realize a design mutation suggested by the emergent patterns. Finally, the designer performs data mining to discern the dominant features of the solutions generated and represents these using the original schemata consisting of functions, behaviors, and structures.

The final design is represented using rendering and visualization applications. This process is repeated in response to the feedback obtained from the client, each time combining a new set of procedures and representations to serve the

State Space Paradox of Computational Research in Creativity, Table 3

An illustrative scenario for creativity support (Source: Akin et al. 2012)

Creative search scenario based on a hybrid assistance system driven by sudden mental insights (SMIs)		
	Example of problem reformulations driven by SMIs	Representation or procedural system
T0 – initial state	Cognitive schema-based initial problem formulation	Cognitive schema
T1 – first SMI	Case-based solutions	Case-based system
T2 – second SMI	Shape formalism rule-based solutions	Rule-based system
T3 – third SMI	Emergent shape-based solutions	Shape grammar formalism
T4 – fourth SMI	Generative rule-based transformation of solutions	Genetic algorithm
T5 – fifth SMI	Data mining-based selection of solutions	Data mining algorithm

purposes of creativity. Clearly, the realization of such a scenario would require standardization and interoperability between current digital platforms and applications. If the requisite support in the form of building information modeling, integrated with data exchange standards, is available (Akin et al. 2012), such a process promises to create environments within which human creative behavior can be enhanced and extended.

The Paradox of Creativity Research

The State Space of Creativity

All digital systems of creativity, whether intended for assistance or emulation of the process, exist within an implicit or explicit *state space* (Newell and Simon 1972). The state space represents any finite slice of time in the digital system's functionality through *entities*, *operations*, *goals*, *heuristics*, and *predicates* that apply to that moment in time. This is a powerful concept because it makes talking about the digitally modeled process of creativity possible, or any formalized process, in discrete terms.

At any time-slice, the digital application works with representational and procedural applications toward satisfying a goal (Tables 1, 2, 3). This goal may be to determine if a given object is creative (i.e., Darcy), or to create an object that emulates features it may be considered creative (i.e., Aaron, Serendipity Machine). In either case, the details of the outcomes are computable from the specifics of the state space. All that goes into the computation, whether it is a set of criteria to interpret patterns and colors on a painting, rules of color theory, a generative algorithm to transform a given *genotype*, an emergent pattern, or the requirement specification for a layout generator, all is subsumed in the state space representation. In other words, these systems like all other computer programs are *closed systems*. Because their input parameters and possible outcomes are predefined, they cannot behave in any manner that is not preprogrammed through these definitions.

A human agent, on the other hand, is an *open system* and functions in an evolving state space. She changes the initial state, the methods of operation that transform states, and the scope of acceptable solutions, at will (Simon 1973). In other words, depending on the circumstance she may prefer *blue*, *sad*, and *subdued* over *red*, *bloody*, and *violent*; as well as to shift the criteria of selection to a voting mechanism by onlookers. The permutations are as endless as concepts carried in one's head, including those that are not possible to express in words or represent in symbolic notation.

The State Space Paradox

There have been attempts to emulate the kind of behavior seen in open systems. Genetic algorithms, for example, that produce transformations on given genotypes are limited by the range and complexity of these symbol strings. In response to this limitation, new variations of genetic algorithms have been developed in which an algorithm permutes the symbol string, thus making the outcomes they induce less predictable. However, far from escaping the limitations of a closed system, this approach simply

embeds one closed system (i.e., permutation of the genotypes) inside another one (i.e., generation of designs based on the genotypes). In the end, all that such a digital application can do is subsumed in its state space. This is the essence of the State Space Paradox (SSP) of computational research on creativity.

The SSP arises when an attempt is made to replicate some aspects of creative behavior by means of automated or computational closed systems. The typical argument made in systems that claim to have automated creativity is on the basis that the digital application alters the initial state space of the problem by modifying or shifting it onto another structure. For instance, Rosenman et al. state: "In creative design the state space has to be [re]-formulated. This may include extending the state space of possible solutions or creating a new state space" (Rosenman and Gero 1993, pp. 114).

This implies that achieving a creative solution involves the definition or redefinition of a problem space as distinct from the one(s) that were given at the outset of the digital systems operations. In other words, a closed computer system, in order to be creative, must redefine its own state space. Newell and Simon (1972, pp. 76) define a state space representation of *search* as the set of three indispensable components: initial state (I), conditions on the admissible transformations from one state to the next (C), and characteristics of a terminal state (T). Thus, the search space in a given state space of problem i can be defined as $S_i = \{I_i, C_i, T_i\}$.

The creative computer system, foreseen in Rosenman and Gero (1993), and other statements that have followed its lead, then, have to be either capable of defining a new state space, say S_j , or be able to modify the original space, S_i , into a new space, S_i' . In the former case, the computer program would generate the set $\{I_j, C_j, T_j\}$, and in the latter case, it would generate $\{I_i', C_i', T_i'\}$ based on the original set $\{I_i, C_i, T_i\}$. In either case, the new space is generated by the closed computer system which can only be achieved by applying C_i , the only operator set it has, to I_i , or its descendants generated by earlier applications of C_i . Therefore, $\{I_j, C_j, T_j\} \subseteq S_i$; $\{I_i', C_i', T_i'\} \subseteq S_i$.

Thus, anything that is generated by a closed system is by definition a proper subset of its state space.

The Consequences of the Paradox

The SSP has a serious implication for how humans regard creativity-related computer systems. Tautologically, they are incapable of exhibiting the creativity that open systems possess, in a human or otherwise. This does not negate the possibility that digital creativity applications can and will invoke the SMI response in a human observer. However, they do not have the capacity to break out of their state space boundaries, regardless of the ingenuity the programmers may have built into them.

SMI inducing creative computer systems do not get a break when they are considered in the context of their cultural milieu. A principal reason why creativity is sought after is because it is scarce. Creativity is basically a rare human act. There are very few individuals who are considered truly creative and their lives are finite. This is a tautological outcome. If there was an overabundance of creative acts, one would no longer be willing to call them creative – or the word creative would have an entirely different meaning.

If automated systems could produce things that resemble creative ones that humans produce, there would be an overabundance of so-called creative objects. This would, without a doubt, make humans value them less, and the target of creativity would shift. Creativity is not an absolute thing. It defies static definition and criteria of recognition. Different cultural contexts, time, place, collective agreement among individuals, and evolution of human taste and choice significantly influence what they call creative. Thus, attaining it through well-defined and rational means will inevitably run into some form of the State Space Paradox.

Conclusion and Future Directions

While the going has been tough up to now, given the State Space Paradox, creativity inducing or

emulating digital systems have an even tougher road ahead of them. They will neither impress their creators, or anyone else for that matter, beyond the first SMI impression, nor will go beyond what is culturally considered a gimmick. This does not preclude the occasional digital application that is so smart that it will become the artist's, or creator's, reliable companion with its superior interface design and time-saving functions. However, in the end, a thorough analysis, beyond the SMI, will show that the human collaborator of the digital assistant will determine a product's creativity. This is not so much a perspective of a Luddite, as it is one of a cultural determinism. What one considers creative is a product of all of the traits that humans possess. For a machine to match that would require the machine to have all traits of humans.

Cross-References

- ▶ [Creativity Across Cultures](#)
- ▶ [Creativity in Puzzles, Inventions, and Designs: Sudden Mental Insight Phenomenon](#)
- ▶ [Creativity Machine® Paradigm](#)
- ▶ [Creativity, Experiential Theories](#)
- ▶ [In Search of Cognitive Foundations of Creativity](#)
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Statistics

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Strategic Alliance

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Strategic Change

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- ▶ [Epidemiology of Innovation: Concepts and Constructs](#)

Strategic Renewal

- ▶ [Corporate Entrepreneurship](#)

Strategic Scanning of SME

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Synonyms

[Observation](#); [Planning](#); [Survey](#); [Vision](#)

Introduction

The words “strategic” and “scanning” have to be redefined when applied to SME. Indeed, the specific nature of the medium-sized business firms, and even more, of the smaller ones, require challenging usual definitions commonly given in handbooks of management (Aguilar 1967; Albright 2004). SME specificity is based, firstly, on the “opening” of the organization (Gilad and Gilad 2003) and, secondly, on the “closing” links between the “economic” and “social” sides of business (Hansen and Hamilton 2011). Dealing with four logics of action (Marchesnay 1998), four ideal types of entrepreneurs are described,

each one working with different sorts and levels of scanning activities (Marchesnay 2011). Ultimately, the risk impacts (dependency, vulnerability), linked to competitive structures and conducts, are classified (7).

The Very Nature of Scanning the SME Environment

Scanning will be defined as the management activity comprising the following stages and tasks: (1) defining the scope to be scanned; (2) choosing the accurate (pertinent) information to be scanned; (3) translating it into feasible data; (4) settling critical values; (5) forecasting feedback decisions, in order to react and adapt to collected or perceived changes.

The scanning activity, in the managerial world, is mostly based on procedures. It is achieved by overspecialized functional units, in charge of preparing and controlling operational divisions. Executives periodically report on the “state of affairs,” by stressing the most remarkable changes detected inside surveyed scopes. They may also alert, in case of emergency, “just in time,” ever the business units or top management. Referring to the IMC pattern (Intelligence – Modeling – Choice) designed by H.A. Simon, the Intelligence stage is limited to the choice of the selected “facts” reduced to computable data. The Modeling stage applies the procedures designed to collect and process data. The Choice (decision) stage is logically deduced from the previous ones.

With regard to SME, scanning is jointly taken in charge, formally or not, ever by the boss (including associates, family members), and/or by employees. Indeed, many SME entrepreneurs are reluctant to grow beyond 250 people, arguing that they would be “unable to know the first name of each employee.” It means that “information” is mostly collected by informal ways, and even by chance, including highly confidential (“strategic”) data. Then, the intrinsic nature of both collected and required information changes. In place of “formatted” data, the SME entrepreneur is searching for “raw” data. The entrepreneurial

cognitive process is intuitive and systemic, conversely to the managerial one, which is analytic and systematic. Empirical research reveals that, most often, the “small entrepreneur” modifies the IMC sequence and practices “heuristics”: He/she intuitively feels the “right” (satisfying) decision (Choice), just after he/she searches for a justifying model (Modeling) and, ultimately, the accurate information (I).

Mr X planned to buy out a bakery. The “procedural” way would have implied to collect information relative to the local bakery trade market (I), to apply a marketing research model (M), and, consequently, to deduce logically the best place. In fact, Mr X was intimately convinced that one targeted bakery was the best deal. He decided to park early in front of the bakery (M) and to observe, all day, who entered in the shop, what they bought, and so on (I). By doing so, he was convinced of the achievement of his project.

The Very Nature of the Strategic Decision Process of SME Entrepreneurs

Management specialists are firmly convinced that “SME entrepreneurs have no strategy,” due to lack of formal reporting, planning, and forecasting. The prevailing images of SME are that of reluctance to innovation or export, of short-term vision, of refusal to grow, and so on. Those critics are obviously reinforced concerning the smallest units. However, the specific and efficient nature of the strategic process of SME is increasingly acknowledged. For instance, the biggest firms try to “break” their giant and bureaucratic structures and replace them by smaller (more “adhocratic,” according to the classification of organizations by Mintzberg) project units, limited to 250 people.

Strategic management studies confused for a long time corporate strategy with business policy. In 1965, Igor Ansof defined more precisely corporate strategy as the whole set of decisions relative to the “environment.” During the early 1970s, he extended the environment beyond the market and industrial structures, by inclusion of every disruptive events or steady trends (social,

technological, financial, political, and so on) underlying strategic impacts on firm conducts.

As assumed by the so-called process approach (vs the “content one”) of strategy, the environment is currently perceived as turbulent, always changing, so that it needs to be carefully and extensively surveyed. Each entrepreneur has primarily to scan his own “specified environment,” comprising the whole set of both individual stakeholders and social institutions. But he/she has nowadays to scan information at a larger, even worldwide, level.

Mr P. started up a business based on motor GPL process (Liquefied Petroleum Gas : use of gas, usually combined with a “classical” oil motor). But the technique revealed to be highly unstable, not entirely mastered, so that it entailed accidents. Thus, after each trouble, the European Community sharply changed security rules and norms, in such a way that the entrepreneur was unable to scan “just in time” the data and quickly adapt. He resigned himself to close his workshop.

An Organization Without Frontiers

The frontier between “in” and “out” of the small-sized organization is highly porous. It first means that the entrepreneur has to scan also his/her own employees. In the “harvest” of indoor strategic information, the “accurate” data are often the most spontaneous, due to the fact that the written (formal, reported) information distorts the message and excludes the most part of perceived signals.

Mr P., a pork butcher entrepreneur, compelled his delivery man, as soon as he returned to the factory, to enter in his office. He charged with relating spontaneously, “higgledy-piggledy,” everything he had seen, heard, smelled, etc., in the warehouse, or been told with the receiving agent. In this way, the entrepreneur collected current (“fresh”) information concerning new products or packaging, prices, margins of competitors, consumers reactions, and so on. Of course, the employee would have been unable to write a fruitful formal report.

Inside small organizations, scanning information relative to the human climate is unavoidable. Every entrepreneur has his own “sensors,” based on experience, intuition, and knowledge of each employee. But human scanning is incomparably harder than the technical one, namely, the relationships between people or departments. So, the entrepreneur has to adapt his/her behavior in accordance with the scanned (perceived or reported) information, in order to reduce conflicts. He/she may use arguments based on affect (“Please, be kind, come on Saturday to finish the job”), effect (“The job was promised for Friday”), or intellect (“If the job is not finished, we lose future orders”).

He/she has to similarly adapt with the external stakeholders. So, the SME entrepreneur must together pay attention to three targets:

- Firstly, efficacy (rate of attainment of the forecasted goals)
- Secondly, efficiency (use rate of available resources)
- Thirdly, effectiveness (rate of individual and collective satisfactions)

Related with the perceived rate of involvement, a high level of effectiveness (human and social performance) is assumed to have a positive impact on the two other targeted performances. However, too many SME primarily focus on efficacy and, above all, efficiency, at the expense of the human side.

A Mix of Economic and Social Incentives

Similarly, the frontier between “economic” and “social” environments is porous. The visionary process of the entrepreneur must include the two sides. For instance, besides the “classical” human resources management, the entrepreneur must scan the main trends concerning demography, education, new habits, and aspirations, and evaluate their impact on his own business. Even in his/her close neighborhood, he/she has to adapt the level and the nature of the required competences and jobs, due to technical and economic changes. Concerning the business strategy, relative to the choice of technologies, products, and

markets, the vision must also merge social and economic evolutions. Nowadays, every entrepreneur is faced with a so-called new or hyper modernity, comprising a mix of globalization and localization, new ethical values, new competitors, tastes, and habits, and so on.

The visionary process, namely, the entrepreneurial perception of the future events and decisions, is bi-dimensional, comprising “length” and “width.” It has been observed four typical cases:

- Some entrepreneurs have both “long-term” and “large extent” visions, coping with highly turbulent environments, and requiring a strong scanning activity.
- Entrepreneurs preferably working in stable environments or mature businesses have a “shortsighted” vision, needing a weak scanning activity.
- Entrepreneurs focusing on their own business and skill try to exclusively foresee future changes (technology-push or market-pull) linked to the life cycle of their own specialty. They scan the surrounding and present facts and events.
- But most of SME entrepreneurs focus exclusively on their nearby “milieu.” As evidenced by searchers on entrepreneurship, the exceedingly embedded entrepreneurs reveal some propensity to avoid changes. They appear as somewhat shortsighted and narrow minded businessmen.

Mr M., a medium-sized entrepreneur, located in a rural area, manufactured all sorts of lights and lamps, and traded them with specialized shops and big retailers. But new competitors, originated from emergent countries, sharply invaded the European market, offering lower prices and standardized goods. Mr P., until then conservative in matters of marketing and product management, was forced to change his mind. A visionary scanning of the future of the lamp industry convinced him to specialize in designing, manufacturing, and installation of ceiling lights for commercial areas, well suited to each case. He recruited designers, reinforced the sale force, and sharply reduced the manufacturing capacity, by outsourcing. Since this strategic change, his firm has got the European leadership of that niche.

“Scanning” the Logic of Action of Each Entrepreneur

Both content and importance of scanning are primarily linked to the identity of each entrepreneur: who he/she is, what he/she does, and why. That identity determines his/her “logic of action.” Entrepreneurship researches point up four dominant logics, each one being defined by the hierarchy between several aspirations (what is called a “lexicographic function”):

- The “survival” logic prioritizes the income maximization, as observed among a great part of the smallest and one people enterprises. As a second best, the entrepreneur may search for the “survival” of his/her business, until his/her retirement or his/her recruitment as a salaried worker.
- The “patrimonial” logic focuses on the accumulation and reinforcement of the family or personal tangible assets (the patrimony), in order to perpetuate the enterprise. As a second best, and by way of consequence, it attempts to maintain the independence of the capital, in order to preserve the personal or family governance. Growth and expansion contribute to enhance perpetuation and independence.
- The “managerial” logic focuses on the growth of mature markets, viewed as the best way to get more profits. Profits are targeted as a way to both pay the shareholders and self-finance expansion and efficiency costs.
- The “entrepreneurial” logic is based on innovative practices. It firstly implies the search of a rapid growth in highly expanding and risky markets. As a second best, the innovator is willing to be free, to hold his/her autonomy of decision, and searches for various financial supports. In the first stage of the growth of a nascent business, he/she does not focus on perpetuation, maybe hoping to sell patents or maybe the entire enterprise.

Linking the Type of Entrepreneur and the Scanning Intensity

The SME entrepreneur may be typified, concerning their scanning practice, by crossing

the two dimensions mentioned above, namely, the logic of action and the environmental embeddedness. Four “ideal types” are suggested.

The “Isolated” Entrepreneurs

They have no stable and dense relationships with their nearby environment, including stakeholders. For instance, their reluctance to take in charge the commercial side, preferring to “stay in the workshop,” has been observed. Consequently, their scanning activity is poor, “waiting for the client,” weakly opened to innovative facts, habits evolution, fashionable products, etc. They are viewed as almost short sighted and short minded. However, they succeed, for instance, in markets based on craft skills, tradition, and, nowadays, ecology. This also comprises a lot of activities with low (financial) value creation, so they are outsourced by bigger firms.

This entrepreneur has owned, for several years, a small factory, working with local wood workers, located in a National Park, a wooded country. He manufactures outdoor furniture, for picnic or camping sites with facilities, managed by private owners or public agencies. He has no relations with the surrounding villages and farms, except for wood deliveries. He mentioned that he called the Craft Chamber of the neighboring town in order to get labor support, but “they were unskilled,” so that he did not use them. The furniture is well made, and robust, but his firm suffers from no advertising and market policy, from a lack of designing and novelties, from remoteness from the main clients, located near the Mediterranean Sea, and, above all, from cutthroat competition by Eastern Europe manufacturers. He intends to close his workshop and to start again near the sea coast. But he does not intend to change his practices. . .

The “Notable” Entrepreneurs

They primarily aspire to be socially recognized as influential people, especially when they are of humble origin. Besides their image of successful businessman, they are in search of some “notability,” as “eminent” members of local Society. For instance, they want to be elected to political councils or professional institutions.

They usually sponsor or preside over local sports clubs, and support humanitarian (religious, philosophical, artistic) institutions or events. That social activity is however closely linked to the professional one, above all when those entrepreneurs work in markets dominated by public bids – for instance, building, roads, public works, and so on.

“Notable” entrepreneurs take great care with human relationships. Inside their enterprise, they try to quickly perceive any troublesome signs or incidents, and behave as *pater familias* – as is usual in craft manufacturing. Outside, they are always scanning their various networks, in order to detect confidential information, such as “intruders,” new public projects and bids, and so on. Moreover, they prioritize the family patrimony, searching for physical assets (“stone and land”), preferably to immaterial ones (patents, brands). They try to maintain the family governance (no associates, no leverage).

Mr N., of modest origin, got leadership in the regional public market of garbage disposal and cleaning. Deeply embedded in social networks, he supports or presides over the main professional clubs (football, rugby, handball. . .) of regional cities, as well as “smaller clubs” of “smaller towns.” He recruits a great part of his workers from among the players. He is an influential member of the regional chamber of commerce and of a lot of official committees. He is used to assert in media that he takes great care to “not put all his eggs in the same basket.” He seizes the opportunity of league matches to invite “notables” (elected representative, influential people) and stakeholders (clients, suppliers, bankers, etc.), so enhancing the opportunity to collect first hand strategic information. His wife and son are deeply involved in other units of the group. He bought lands and farms in the Natural Park of Camargue (near the Mediterranean Sea), as both a profitable investment (around tourism and entertainments) and a perennial patrimony for the family.

The “Nomad” Entrepreneurs

They may be defined as “profit seekers” and “managerial minded.” They are well educated,

skilled in management or engineering. A lot of them were executives before creating their own business. They work on mature, yet expanding markets, so that they primarily aim at improving efficacy and efficiency, profitability, and productivity. They preferably plan changes in business strategy (technologies, markets, and products). Their reluctance to incrementally react to scanned events may be explained by the fact that a lot of “nomads” are subcontractors or suppliers for bigger firms. They may even appear as “quasi-firms,” actually governed by financial investors or big concerns.

“Nomads” avoid being “stuck in the milieu,” to be irreversibly embedded in a local network. Being averse to proximity, they maintain distance from local institutions. Moreover, they can easily close their business, as soon as they find a more munificent place (free tax, activity parks, or more attractive market), including settling in a foreign country. Consequently, effectiveness problems and local legitimacy being none of their business, they give preference to worker flexibility.

The scanning tasks are primarily centered on facts and events concerning the business: innovations, competitors’ decisions or “ploys,” public rules (laws and norms, tax incentives, financial). An executive may be in charge of formally deal with and classifying that factual information. On the other hand, the boss has to search for all sorts of “informal” information, “harvested,” for instance, during meetings, congresses, and so on.

Mr X. resigned his job of engineer in a big concern to settle in business on his own one’s account. He was located in an activity park, where he benefited from free taxes and financial incentives by the regional council, especially given for job creations. He manufactured all sorts of wooden furniture for wineries and wine estates (barrels, display shelves, and so on). His business worked well, but being a “nomad” he worried about two things: the lack of involvement of the employees, reluctant to increase their productivity or work on Saturdays; the distance to the “core market,” which was in “Bordelais” (Bordeaux wines, on the Atlantic coast), and not in “Languedoc” (Mediterranean vineyards). He was searching for another place, and did not

intend to pay back the regional subsidies. His scanning activity was focused on information concerning the wine industry, underlying opportunities for profit and sales increases, cut-off costs, or financial supports.

The “Enterprising” Entrepreneurs

They are the most involved in scanning tasks. Firstly, they work in turbulent markets, needing high reactivity. Secondly, they are “open minded,” and so benefit from a high propensity to seize opportunities in their environment. Thirdly, they are “networkers,” including both “institutional” and “spontaneous” networks.

Thus, “enterprising” entrepreneurs cultivate their social relationships. They actively participate in the local (regional) life, as ever actors or sponsors. They thereby improve effectiveness (social climate, individual involvement) inside their enterprise. Otherwise, the various social (“weak” or “strong”) links underlie a “bundle” of information. Some of them are perceived as a strategic opportunity by the “enterprising”; they are seen as a “scarce resource” and so are included in “core capacities” inside the organization. Moreover, the “enterprising” entrepreneurs try to forecast the best innovative decisions and investment budgets. Thus, they use formal procedures in order to systematically collect formal or published information, concerning laws and rules, technological innovations, social and political facts impacting their own business. The “enterprising entrepreneurs,” working in risky businesses, hope for a high return on investment, based on high rates of innovation and demand. Their high locus of control gives incentive to take advantage of any “undiscovered” information, or to make productive use of “available” information. They are typically opportunistic.

The O. family (two brothers and their sister) run their family business, located since several generations in a small rural town. They are deeply embedded: Their grandfather was the mayor, and he gave his name to the main street. They manufacture door and window frames, by using, until recent years, wood from nearby forests. Faced with the declining demand of craft wood frames, they decided to scan their business

area more deeply, in order to detect emerging needs and tastes, and new technologies (processes and raw materials). They concluded that, firstly, the demand for building and restoring houses inspired by the regional style was booming, particularly by retired or urban clients. Secondly, there were new materials, other than wooden made, more resistant and esthetic. Thirdly, the red pine tree of Finland did not rot, in contrast to the local wood. Thus, they renewed their business strategy, by improving the design of their frames, adapting each project to the desires of the client and the wishes of the architect. The "O. Enterprise" won several prizes, at both regional and national levels, due in part to the protection of the local architectural patrimony.

The Very Nature of Competitive Risks for SME Entrepreneurs

Whatever the type of entrepreneur, they all have to primarily face with two main strategic troubles on their market – a risk of dependency and of high vulnerability. Thus, the SME entrepreneur must currently survey their positioning inside their competitive environment. Several criteria may be practiced.

Avoiding Excessive Dependency

The rate of dependency may be practically scanned by using the following criteria:

- First, detect the key transactions where (1) the number of actual suppliers or clients for a given transaction is weak, even unique, (2) the amount of potential (substitutable) stakeholders is weak, even zero, (3) that transaction is essential to the working, and even the survival of the business.
- Second, in case of high dependency, make a guess about the intent of the other people, and evaluate consequences in matter of exchange costs, pricing, and margins.
- Third, try to make the relationship more secure and stable.
- Fourth, if unsuccessful, try to find a substitute transaction by strategic changes, as, for

instance, new raw materials or machines, new clients and delivery channel, new products.

As sportsmen usually say “the best defense is attack.” Troubles due to dependency are weakened, even destroyed, when the entrepreneur improves his/her competitive advantage, by seizing opportunities for some distinctive competence, or by mastering idiosyncratic resources. Entrepreneurs may cooperate with other colleagues in the same state of dependency vis-à-vis big retailers or suppliers – what is called a “coopetitive” strategy (combining competition and cooperation). In any case, a high dependency rate would may increase the scanning activity by the entrepreneur.

Reducing Market Vulnerability

Vulnerability may be defined and evaluated as the firm’s sensibility to any hostile event. Firms or market are usually impacted by very precise features, as, for instance, in the tourism industry, the impact of climatic (lack or excess of rain), or politic (riots) troubles. The main topics of vulnerability are the following ones:

- The market complexity is defined by the number of competitors and the reciprocal impact of individual or collective strategies (for instance, price cut-offs, advertising campaigns, new ventures, new products, etc.). Some markets, in spite of comprising numerous competitors, are highly segmented; others are highly sensitive to “battles,” but the competitors are few (big retailers for instance). But the SME works usually on “market of great number,” according to the theoretical model of “monopolistic competition.” Thus, the entrepreneur has to scan, sometimes day by day, all events, made of threats and opportunities.
- The market accessibility is defined by the ease of entry, but also of exit. The height of entry and exit barriers is made up of entry investment (partly irrecoverable), reputation and skill to acquire, legal rules, and so on. Low barriers increase a priori vulnerability, but the best protection may be to “build a niche,” for instance, by acquiring patents, by signing long-term contracts (a way to reduce

dependency risks), by taking advantage of “singular” skills, and so on.

- The competitor’s aggressiveness is evaluated by the intensity and frequency of disruptive actions. The more the competitors are aggressive, the more the entrepreneur has to survey events: experience, intuition, embeddedness in local institutions and networks reveal to be scanning tools and skills of the greatest importance.

Conclusion and Future Directions

To conclude, SME entrepreneurs would of course prefer to be independent from upstream or downstream activities, to be well protected from intruders, and to peacefully work. However, this case is so infrequent that scanning the environment appears as a crucial task.

Mr B. was a munificent entrepreneur producing traditional pastries in his craft workshop, located in a small town near from an expanding city. He delivered them, at a good price, to bakeries and delicatessens. Born in the village, he enjoyed buying the vineyard where his father was a modest worker and making it profitable. Hoping to be elected as mayor, or even more, his network comprised his main clients, whom he invited to big game hunting in Africa. But he decided to grow, and to work primarily with big retailers. The competition was aggressive, with firms practicing low costs and weak margins, while constantly changing. He became increasingly dependent on sales to big retailing. Unable to payback bank credits, he ultimately closed his workshop, and stayed in wine production.

Entrepreneurship research must deepen knowledge concerning various traits of the scanning activity, as related with a lot of contingent variables. It namely includes the enlarged nearby environment, the new relations between the social and professional life (for instance, lifestyle entrepreneurs), the renewed content of the information system (for instance, the meaning of opportunity), and the increasing role of cognition (for instance, the intuition and perception) in the creative and adaptive processes.

At a more practical level, small entrepreneurs and supporting institutions need more suitable tools to scan the environment. It implies prospecting and developing the networks of stakeholders and installing cognitive signals to rapidly detect innovative opportunities and adaptive reactions.

Cross-References

- ▶ [Business Emergence](#)
- ▶ [Business Start-Up: From Emergence to Development](#)
- ▶ [Craftsman](#)
- ▶ [Creative Styles](#)
- ▶ [Entrepreneurial Opportunity](#)
- ▶ [Entrepreneurship and Small Business Agility](#)
- ▶ [Entrepreneurship and Social Inclusion](#)
- ▶ [Environmental Determinants of Entrepreneurship](#)
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- ▶ [Risk, Uncertainty, and Business Creation](#)
- ▶ [Small Business](#)
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Strategic System

► Business Model

Strategic Thinking and Creative Invention

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Synonyms

Creativity techniques; Heuristics; Metacognition; Self-regulation

Strategic Thinking and Creativity

Creativity and invention are often conceived as underlying mental processes which are far from strategic thinking. Creative and innovative ideas are sometimes interpreted as outcomes of unconscious processes which cannot be predicted and, least of all, controlled by the individual. It seems that creative invention is the result of a sudden insight which cannot be prepared, prompted, and driven by means of deliberate thinking strategies. However, on the other hand, a variety of thinking strategies aimed at facilitating or inducing the emergence of original ideas have been devised and are currently proposed as productive ways to solve problems, lead to discoveries, improve existing artifacts, and build new entities. This implies that creative inventions can be achieved, thanks to specific cognitive processes, which can be activated and orientated according to precise mental plans and can be taught so that people can apply them intentionally.

These conflicting views can be reconciled by distinguishing two possible meanings of “strategic.” In the first case, a behavior or a thinking process is strategic in the sense that it is not erratic, but it has its own regularity,

namely, it follows a systematic and/or recurrent path. This explains why theorists and practitioners suggested specific cognitive strategies, usually consisting of series of mental operations and steps to be followed, which have been proved (on the basis of speculations or empirical tests) to be effective in fostering creative invention. In the second case, “strategic” means that what occurs in the individual’s mind is consciously programmed and monitored by the individual himself, who, before and during the inventive process, exerts a control over such a process. Thus, a process can be strategic according to the first meaning but not to the second one. It is the case of a person who implements a certain reasoning rule spontaneously, without being aware of what he is doing. It is also the case of a person who has been trained to apply a given procedure and now he is induced to apply it automatically. Hence, thinking is strategic in a “weak” sense if a creative outcome is reached through a systematic path, irrespectively of the fact that this happens or does not happen under the deliberate control of the person. Instead, in order to be “strategic” in the strong sense, the thinking process has to be consciously driven so to follow a programmed series of steps intentionally.

Methods for Individual Creative Invention

In order to lead people to be strategic in the first, weak sense, a large number of procedures, techniques, and methods have been devised, all aimed at inducing people to apply specific thinking strategies. Methods which can be applied individually are first reported; in the next section, methods aimed at fostering group creativity are described.

Various strategies aim to facilitate the processes of discovery or invention by the juxtaposition of two or more elements. These strategies are based on the assumption that the combination of disparate elements can lead at insights. The precursor of this kind of techniques was Raimundo Lulio (1235–1316), who designed a “machine for ideas” consisting of several

concentric disks on the edges of which some words were written. By rotating the disks in different positions, you could read the resulting combination of the terms which were aligned: such combination should inspire new concepts. More recently, other procedures have been developed based on the random combination of elements. One of these is to juxtapose the situation needing for improvements or innovation with a word chosen at random from the dictionary so that the combination will produce some useful ideas. For example, given the need of finding a way to reduce noise pollution, the randomly chosen word from the vocabulary was “anthracite,” which triggered the following ideas; the charcoal comes from underground and so one might drive traffic in tunnels or can build the places that need silence (libraries, leisure centers, etc.) undergrounds; anthracite is dark and this reminds the idea that there are tools which protect eyes from strong light, thus suggesting that similar devices protecting ears from loud noises can be invented (e.g., plugs activated by disturbing acoustic stimuli). Another method based on random combinations of items was proposed by Buzan (1974): according to the *combination of symbols* method, a conventional symbol (letter, number, picture) must be associated to each relevant aspect of the situation. These symbols must be grouped in a completely random way as long as new combinations of elements emerge so to prompt to novel ideas. A third technique, called *forced relations*, consists in connecting two elements (objects or ideas) in order to make a third element emerge. For example, if the goal is to help a person lying in bed to read, the two terms (“reading” and “bed”) are put in relation. Reading is done usually with the trunk of the body in the upright position, while in bed you stay in a horizontal plane. It is therefore necessary to reduce the gap between the two positions. One can thus think of a device which projects the page of the book you are reading onto a horizontal plane, or a periscope that allows reading the book placed perpendicular to the bed, or a particular bookstand suspended above your head.

A systematic use of the combination of the elements occurs in the *morphological synthesis*,

due to the astronomer Fritz Zwicky. The procedure requires first to describe the various aspects of an object or concept and identify the main features of what has to be invented. Then you need to envisage the possible values of those aspects (different materials, different uses, etc.). In the last phase, values and features are combined in order to produce associations that may not previously considered be particularly useful. For instance, if you are asked to invent a new type of vehicle, you may decide to operate on two aspects: the mode of vehicle power and the medium along which it must travel. Possible features of the first aspect are force of gravity, fuel, etc. Possible features of the second aspect are tube, air, etc. Then you examine all the possible combinations (vehicle driven by the force of gravity and traveling in a tube, vehicle driven by the force of gravity and traveling in the air, etc.). You discard those combinations that correspond to vehicle types that already exist and those definitely impossible; the rest may suggest some useful idea.

The *analysis of the characteristics*, also known as *attribute listing* or *constituent element* method, consists of two phases. In the first phase, the elements, attributes, or properties of an object or situation are listed in a comprehensive manner. In the second phase, all the elements listed are taken into consideration one by one and one wonders if they cannot be transformed in order to enhance their effectiveness. The method was developed especially in relation to the invention of mechanical devices which can be broken down into parts. For example, if you are asked to invent a new piece of chalk to write on the board, you must list the most important attributes of the object in question: shape, size, color, etc. Then you devise possible changes of these attributes: colors other than white, increased size of the piece of chalk, etc. Finally, you apply attributes possessed by other objects to the piece of chalk, for example, the way a cigarette is held in the hand. This might suggest you to invent a new type of pieces of chalk which can be handled, thanks to a mouthpiece, so to prevent your hand to get dirty. Or if you are asked to devise a new model of screwdriver, you have to list the attributes of

the tool (blade, handle, end to insert into the screw, etc.). Changes of each attribute can lead to a more user-friendly instrument: the shaft of the screwdriver can be hexagonal instead of round, the tip can be made adaptable to various forms of screws, etc.

The *fractionation* strategy requires breaking the situation into parts so that implicit assumptions related to the whole fail to bias reasoning. For example, if the problem is, again, to reduce noise pollution, you will examine the different components, such as the various causes (transportation, etc.) or the means through which the sound propagates (air, walls of the buildings, etc.). For each component, you will try to devise measures that avoid the inconveniences complained (e.g., silent tires or insulating building materials).

Another procedure, devised by De Bono (1969), is the *impossible intermediate*. Faced with an obstacle, think of a solution seemingly impossible. Then let your mind free to elaborate this solution, until you reach a new and feasible way out. For example, given the request of making the process of unloading cargo from ships more efficient, you can think about this impossible solution: unloading the ship while it is still at sea. How to make this feasible? Ships could be designed to allow to anticipate some of unloading procedures: workers could be carried, with helicopters, on the ship approaching the harbor in order to start the stevedores unloading, so that, once the ship arrives to the port, they will only transfer the cargo on trucks.

Finally, it is worth mentioning the method suggested by Finke (Smith et al. 1992), consisting in showing individuals some simple geometric shapes and then ask them to mentally combine them with the objective to achieve an overall form with a final meaning or a final object that has some useful features. In this strategy, people are presented three geometric figures that are either two- or three-dimensional. They observe the figures for some time and then close their eyes for 2 min trying to mentally combine the figures into a composite image with a sense, which they must then draw. Individuals are told that they cannot bend, stretch, or compress the given

figures, but they can change the size, orientation, position, and the material of the stimulus figures. The synthesis of mental images has been extensively investigated in recent times because of its functional properties. This synthesis leads to the possibility that a global image resulting from the combination of several partial images can have more meaning than their constituent parts. This is a property closely related to creativity because it often involves the ability to go beyond the immediate meaning of things and to find these hidden or discounted properties. The outcome of the mental synthesis is in fact a new mental picture that could help, by means of an intuition, to better understand the original meaning. Some people who have applied this technique have reported to be surprised by their imaginative creation.

Strategic Thinking and Creative Collaboration

The relationship between strategic thinking and creative invention can be examined not just at the individual but also at group level. The potential of groups for creativity can be better understood looking at the history of inventions, which shows that most significant innovations involved various forms of joint efforts. These famous collaborations include Albert Einstein and Niels Bohr, Pablo Picasso and Simone de Beauvoir, and George Bateson and Margaret Mead, just to list a few. Furthermore, nowadays, companies are increasingly recognizing the added value of collaboration in the development of innovative products and services and the key role played by the diversity of skills and knowledge in this process.

Several features of collaboration might explain why it is so beneficial to creativity and innovation. Firstly, collaboration allows breaking down complex problems and specialized division of labor. Secondly, collaboration fosters divergent thinking, supports synergistic coordination, and allows members to share knowledge and information. Considering the importance of creative teamwork for innovation, the definition of strategies to support collective idea generation

has become an important challenge of creativity research.

Historically, *brainstorming* has arguably become the most widely known and used technique to enhance creative synergy. This method was popularized by Alex Osborn in the 1940s and 1950s and described in his book *Applied Imagination*. Essentially, brainstorming consists of a group of people collaborating in a noncritical environment to generate a high number of ideas and is characterized by four basic rules:

- (a) Withhold criticisms: the disapproval or rejection of the ideas should be postponed to a second stage; averse judgments of ideas – such as “it won’t work,” “it is not feasible,” or “it is too expensive” – are not allowed.
- (b) Encourage the generation of audacious, exaggerated ideas: team members should be pushed to free their imagination and propose provocative or even bizarre ideas.
- (c) Focus on the quantity of ideas and not their quality: the greater is the number of ideas generated, the more likely it is that useful ideas will result.
- (d) Build upon and elaborate each other ideas (*hitchhiking*): in addition to contribute with their own ideas, participants should try to suggest how ideas proposed by other group members could be improved or combined into new ones.

The technique typically involves gathering a group of 5–6 participants (including both novices and experts, from a wide variety of background). Regardless of the number of participants, group members should be well briefed about the rules, the problem, and its main implications. The brainstorming panel also includes a leader (also called facilitator or panel chairman) and an idea recorder (who can be the same person of the facilitator). The leader should be well trained in the technique and has several tasks, which include ensuring that participants are adequately briefed on the objectives of the meeting and on the characteristics of the problem, maintaining the rapid flow of ideas, keeping the group focused, preventing participants from getting discouraged, and favoring a positive group climate. The leader also contributes to the

generation of ideas. Most authors agree about the importance to have a comfortable setting, where coworkers can interact without distractions and enjoy a relaxing atmosphere. During a brainstorming session, the generation of ideas can be solicited in different ways, depending on the characteristics of the group: in the so-called round-robin method, members take turns, in order, offering a single idea, and therefore each member is given a chance to speak; in the alternative, “freewheeling” brainstorm, participants express their ideas spontaneously and the facilitator records the ideas as they are suggested. At the end of the brainstorming session, after a large set of ideas have been generated, they are evaluated and selected. The evaluation of the ideas is kept separated from the generation phases and occurs after a short interval of time. The screening can be done by the group itself, by a subgroup of its members, or by third people and consists in the aggregation, classification, and identification of useful ideas, according to explicit criteria that are coherent with the organization’s objectives.

In the course of the years, several variations of the original brainstorming technique have been introduced. For example, in the *brain-writing* technique, each participant generates a number of ideas, then records them individually (i.e., using post-it notes or small cards) and pass them on to the next person, who uses them as a trigger for his own thoughts. The *nominal group* technique is another variant of brainstorming that encourages all group members to participate, preventing the monopolization of the discussion by a single person. It is considered particularly useful when the group needs to prioritize a large number of options, within a structure that supports inclusion and consensus-building. The technique consists in having participants write their ideas on a piece of paper, and then the moderator collects the ideas, which are ranked by the group independently. After that, the list of ideas is rewritten in priority order. Finally, it is worth mentioning that in recent years, computerized versions of the manual brainstorming technique have been proposed. *Electronic brainstorming* systems can be supported by different types of informatics tools (spanning from e-mail to

peer-to-peer software) and allow participants to display and share a list of ideas using a computer console.

The increasing popularity achieved by brainstorming over the years has led researchers to investigate the effectiveness of this technique in enhancing group creative performance. Unfortunately, the bulk of empirical evidence indicates that group brainstorming is not more effective than individual brainstorming (Paulus and Nijstad 2003). In a typical experiment of this kind, the creative performance by a group of participants (“real groups”) is compared to that of the same number of participants working individually (“nominal groups”). In most cases, the result of the comparison has found that real groups tend to generate less ideas than nominal groups. This reduced productivity might be explained by both social and cognitive influence processes. The first category may include the effects of social comparison among members, such as evaluation apprehension (i.e., fear negative evaluations from others), social loafing (individuals give less effort in a group because responsibility is diffused), and social matching (the tendency to conform to peers, who lead group members to adapt their proposals to be similar to others). Cognitive influence processes include the so-called production-blocking effect (in the course of idea generation, one person speaks while the others listen, and this results in a cognitive interference that hinders the generation of ideas), excessive demands on cognitive resources and working memory (due to the dual tasks of paying attention to others’ ideas and generating one’s own ideas), distractions and fixation (being exposed to others’ ideas, members tend to focus on those and block other types of ideas from taking hold). Paulus and Brown (2007) have proposed a cognitive-social-motivational perspective on brainstorming, which provides a basis for understanding group creative processes for ideational tasks. They argued that the creative process occurring in groups has two key dimensions: a social dimension, since it results from the interaction with other individuals, and a cognitive dimension, because group members share each other’s

ideas, views, and information. The model posits that in order to achieve high levels of creativity, group members need to focus their attention deeply on the activities of the other participants. By focusing on others’ ideas, new insights can be stimulated, new knowledge accessed, and more elaborated combinations generated. However, allocating attention and avoiding distractions is only the first step: the shared ideas must be further processed and elaborated by participants, and this involves the ability to understand, remember, evaluate and integrate the shared information. These abilities, in turn, can be affected by group context factors, such as the structure and the motivation of the task.

In sum, group members’ interactions and processes play a mediating role in determining how the individual ideas and products are integrated and developed into group-level creativity outcomes. From this perspective, a significant role is played by behaviors that are able to positively influence group functioning, such as inspiring group members to elevate their goals, providing feedback and individualized consideration, asking for and recognizing different ideas (Taggar 2002). For instance, Sawyer (2007) analyzed in detail the behavior of several improvisational teams in various creative areas (jazz, theater) and concluded that the majority of successful teams were distinguished by their ability to reach a state of *group flow*, a peak experience where a group is performing at its top level of ability. Flow is a psychological state characterized by global positivity and a high level of complexity, in which the perception of a higher-than-average opportunities for action (challenges) is coupled with the perception of appropriate skills. Other peculiar characteristics of this experience include high levels of concentration and involvement in the task at hand, enjoyment, a positive affective state, and intrinsic motivation. Sawyer (2007) identified several conditions which facilitate the occurrence of this optimal state at group level, such as close listening, complete concentration, feelings of autonomy, competence, mutual connection, and equal participation in the creation of the final performance. According to Sawyer, the achievement of

group flow involves a balance between the extrinsic/intrinsic nature of the goal and preexisting structures shared by the team members (e.g., know-how, instructions, repertory of cultural symbols, and set of tacit practices).

Conclusions and Future Directions

Once one or more techniques or methods, such as those mentioned in the previous sections, have been acquired by an individual or a group, what does lead people to apply them in a proper manner? A strategic, in the second sense highlighted at the beginning of this entry, attitude seems to be relevant. In fact, persons should realize that the situation they are facing needs to be approached through the creative technique they were taught. Moreover, if they know more than one technique, they have to decide which technique is better according to the situation in question (Antonietti et al. 2000). In addition, they should perceive if they are applying the chosen technique in the right way and if they are achieving the expected outcomes; otherwise, they should shift to another technique. In other words, a metacognitive attitude and self-regulatory skills are requested to monitor and control the application of strategies and methods aimed at supporting the generation of original and innovative ideas. However, such a metacognitive competence has been poorly investigated in the field of creativity (Jaušovec 1994; De Stobbeleir et al. 2011). A task for future research is to understand to what extent metacognition and self-regulation are actually beneficial to the creative and inventive process.

Cross-References

- ▶ [Analogies and Analogical Reasoning in Invention](#)
- ▶ [Brainstorming and Invention](#)
- ▶ [Co-conception and Entrepreneurial Strategies](#)
- ▶ [Corporate Creativity](#)
- ▶ [Creative Problem Solving](#)
- ▶ [Creative Thinking Training](#)
- ▶ [Creativity Techniques](#)
- ▶ [Interaction, Simulation, and Invention](#)
- ▶ [Thinking Skills, Development](#)

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- ▶ Inventive Problem Solving (TRIZ), Theory

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Systems Theory and Innovation

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Synonyms

[Creativity](#); [Ecosystems](#); [Systems of innovation](#)

Creativity and Innovation

Creativity and innovation are attributes of individual people but also features of organizations like firms, cultural institutions, and social networks. In the knowledge economy, they are of increasing value for developing emergent and advanced countries. In the last years, “systems of innovation” have emerged as a new research topic, in which the analysis has been broadened from artifacts to systems, from firms to clusters and networks.

Literature provides different definitions of “innovation.” Joseph Schumpeter is often considered the first economist to draw attention to the importance of innovation. Innovation is closely related to development in Schumpeter’s theory: indeed, economic development is driven by the discontinuous emergence of new combinations (innovations) that are economically more viable than the old way of doing things (Schumpeter 1934). Drawing from Schumpeter’s theory, researchers have also been pointing out the importance of the succession of innovation and stability phases for the firm development.

Most of the innovation definitions have focused on similar points with different perspectives, as they imply change and renewal for a better situation. The Oslo Manual, by the Organization for Economic Cooperation and Development (OECD 1997), defines innovation by linking it to technological change, while the European Union gives a broader definition (1995)

introducing the change in workforce talent, working conditions, and managerial and organizational jobs.

Creativity and innovation are overlapping concepts: indeed, creativity is about the origination of new ideas. The creation of ideas, images, symbols, design, and cultural expression should be considered a national asset in multiple ways. As developed countries are moving from economies based on tangible assets to ones based on commercialization of intellectual property and other intangible assets (such as research and development, computer software, design, brand, human capital, and organizational systems), creativity and innovation are crucial drivers.

However, concepts like creativity and innovation are not bound to certain assets or institutions. Especially nowadays, they benefit from evolving and overlapping relationships between different institutions: innovation is a more systemic process with tangible implications for the whole society. Hence, systems theory can be a fruitful approach in order to understand innovation and creativity not only from an institutional perspective but how it has been produced within society.

Moreover, culture and society can be no longer understood in isolation from the media: media should be defined as “molding forces.” In this sense “mediatization” has evolved as a key concept to describe a fundamental transformation of the relationship between the media, culture, and society. The term “mediatization” captures the interrelation between media-communicative change, on the one hand, and sociocultural change, on the other. Thus, (science) journalism plays a crucial role in spreading creative and innovative ideas, which in turn become the starting point for further innovation processes.

The Development of Innovation Concept

Innovation is considered as a catalyst for economic growth, which does not rely anymore only on the traditional production’s factors (land, labor, and capital). In particular, Romer (1990) highlighted the weight of technological progress

and ideas as the relevant engine of growth. In the last decade, a paradigm shift has occurred introducing new ways of collaboration between different actors (co-opetition, co-creation, and extension of the value chain) and the integration of commercialization, empirical knowledge, and the public good in order to sustain economic growth at national level.

Traditionally, innovation was conceived in linear terms, that is, the elite science universities or the laboratories in the large corporations would generate a flow of inventions that in turn would be commercialized. Both the traditional Schumpeterian and the linear models have been found inadequate to define innovation. Researchers regard innovation as an evolutionary, complex, nonlinear, and interactive process. Many actors and factors, both inside and outside a firm, play a crucial role: in the ages of customer empowerment, customers are included in the firm value chain which turns into a real-value constellation. Nowadays innovation and research benefit from evolving and overlapping relationships between academia, government, and industry: innovation is a more systemic process, with an accent on effective coordination of a system in which high skills are widely diffused in different areas.

Another way to depict the evolution of the innovation concept is to consider the shift from mode 1 to mode 3. “Mode 1” of knowledge production refers primarily to basic research performed by universities. “Mode 2” focuses on knowledge application and a knowledge-based problem-solving. Expanding and extending the “mode 1” and “mode 2” knowledge production systems, today the “mode 3” is at the heart of a multilateral system, encompassing mutually complementary and reinforcing innovation networks consisting of human and intellectual capital, shaped by social capital and underpinned by financial capital (Carayannis and Campbell 2012).

Since innovation is seen as a systemic process, the use of an alternative approach such as the theory of social systems can lead to new insights. Systems theory is widespread in social sciences, particularly within media and journalism studies,

but only fairly used in the area of creativity and innovation. As Willke (1996) has been arguing, modern systems theory has become one of the main paradigms within social sciences because the highly organized society can only be analyzed through theories with a sufficient self-complexity. One of the major advantages of a system theoretical approach is that it sensitizes the scientific observer to be careful with normative prescriptions or determinism.

As Baecker (2001) argues, systems have never really had a good press, because they seem to suggest that there is more order in society than there really is. This is particularly the case if dealing with concepts such as innovation and creativity, which always bear a slightly muddled connotation. However, systems are not given objects within society. They constitute themselves according to a differentiation based on meaning. Thus, every system comes up with specific internal structures in order to solve a certain kind of complexity that surrounds it in the environment. In other words, every system carries out a certain function within society. Systems theory raises questions about how society is organized on a macro-level in different functional systems such as politics, economy, media, or science and which relationships are upheld between them.

Innovation is a process that occurs in and between various systems and is characterized by cross-sectorial linkages and interdependencies between creative industries, cultural institutions, content and applications production, government, and other industries as well. Since systems theory allows to distinguish and observe different areas within society, one can indeed grasp all these mutual implications with the advantage of dealing with the issue from each system’s distinct point of view.

Theoretical Background and Open-Ended Issues

The Triple Helix theory was devised in the 1990s by professors Henry Etzkowitz and Loet Leydesdorff. They point out that innovation moves outside of a single organization (e.g., Universities are no more ivory towers); thus lateral relationships across boundaries,

rather than hierarchical bureaucratic structures, become more important. Their model refers to a spiral (versus traditional linear) model of innovation that captures multiple reciprocal relationships among institutional settings (government, industry, and university) at different stages in the capitalization of knowledge. These three institutional spheres which formerly operated at arms' length in liberal capitalist societies are increasingly working together with a spiral pattern of linkages emerging at various stages of the innovation process. The "Triple Helix" system of relationships between university, industry, and government can also enhance the effectiveness of universities in developing countries as agents of innovation, industrialization, and sustainable development.

The Triple Helix model has been extended bringing media, "civil society," or "the public" back into the model as a fourth helix: a broader and better understanding of knowledge production and innovation application requires that also the public becomes more integrated into advanced innovation systems. Arguing that the Triple Helix model is not a sufficient condition for long-term growth, the Quadruple Helix Innovation theory associates knowledge production and knowledge use with media, public discourses, creative industries, culture, values, lifestyles, and art. In other words, creative industries, arts, and art universities represent crucial assets for the evolution and advancement of knowledge economies (Carayannis and Campbell 2009). Observing some technology clusters (e.g., Silicon Valley, Route 128, and Waterloo Region), it is also evident the driving and relevant role played by financing organizations (Carayannis and Campbell 2012) or venture capital companies in fostering revenue growth and commercialization (Colapinto and Porlezza 2012). According to Carayannis and Campbell (2009), innovation ecosystems are systems in which different organizations and institutions in public and private sectors (such as governments, universities, research institutions, business communities, and financing organizations) collaborate and compete between each other, thus creating an environment prolific for innovation.

At the higher degree of complexity and dimensionality is associated the Quintuple Helix model which brings in the perspective of the natural environments of society, also for the knowledge production and innovation. This latter interdisciplinary and transdisciplinary framework of analysis relates knowledge, innovation, and natural environments to each other, and it fits the transdisciplinary analysis of sustainable development and social ecology.

Recent theoretical debate concerning social systems leads the readers to the existence of the exchange between actors belonging to different social systems which has a positive influence on firms' innovativeness. Kaufmann and Tödting (2001, p. 795) observe the interactions among three different social systems (business, science, and policy) with different modes of interpretation, decision rules, objectives, and specific communicative standards. Crossing the border to another system increases the diversity of an organization's innovation partners and fosters innovation. Linking different systems stimulates innovativeness and can increase effectiveness more than remaining within the same set of routines. This approach obviously recalls the Triple Helix model. Knowledge is no longer produced only in universities, but people can observe a diversification of the sites of knowledge production which takes place in different settings, from university to government laboratories, industries, and think tanks. However, this diversification has further stimulated university research through inter-sectorial collaboration and has created a wider system.

An alternative but at the same time integrative approach to the Helix model is offered by the theory of social systems. Whereas the Helix model is a strategy of development based on the collaboration among different institutions, systems theory raises questions about how innovation is being accomplished within society and which relationships are upheld between all the different social systems. Systems theory embodies therefore some remarkable potential to relate innovation production and transfer and thus analyze the interdependencies between different systems on a larger, social scale.

Moreover, it allows to examine the concrete liaisons between science and society and the distinctive role played by the media and (science) journalism.

From a systemic perspective, the different helices are autonomous systems. In other words, industry corresponds to the economic system, government corresponds to the political system, universities to the scientific system, and media to the media system. However, every social system observes its environment on its own. But often the instruments to observe the environment are not complex enough in order to take into consideration other systems (cf. Görke and Scholl 2006). The same aspect occurs within the Helix model: how can the interactions between different helices assure knowledge or creativity growth if every helix has a different perspective on why information is regarded as relevant?

That is the point where the media journalism become relevant. Journalism is asked to observe, construct, and reduce complexity within society and integrates information and knowledge about innovation throughout the existing systems. By doing so, journalism creates its own reality and conveys information not in a passive way but produces an actively modeled orientation for society. Journalism becomes a crucial player in today's knowledge societies, though.

Implications for Theory, Policy, and Practice

Theory has to take into account these new forms of knowledge production and the existence of hybrid actors. The complexity of the phenomenon requires a multi-perspective and multidisciplinary approach in defining and explaining the innovation and creativity processes. As industrial and political interests have been integrated into the evaluation, organization, and performance of university research, a change in policy and funding regulations is needed. This means, for instance, that funding agencies contribute to constructing, reproducing, and changing the institutional order of academic research. Indeed, academic research nowadays has to be pursued with openness toward practical applications and commercial exploitation.

University moved from the "ivory tower" to a common entrepreneurial format in the late twentieth century. Many researchers explain the emergence of this new model as a response to the increasing importance of knowledge in innovation systems and the recognition that the university is a relevant player and broker of both knowledge and technology. The entrepreneurial university is required to engage and negotiate with other institutional spheres. Interface specialists appear, especially at centralized level (e.g., technology transfer or university spin-off offices). Most universities have set a press or media relations office which acts as the first point of contact for local, national, and international media. Many communication offices serve to develop communication both inside and outside the university.

It seems therefore that the Helix model, which associates knowledge production and knowledge use with media, is of particular importance in order to understand knowledge production and innovation in modern societies. Particularly scientific journalism observes and describes the interdependencies between science and society. Usually, scientific events chosen for news coverage are such events that are of great interest in the social context of science, that is, in other social systems, such as those news events considered to have medical, political, legal, economic, or moral implications.

As Peters et al. (2008) argue, this systemic notion of science journalism has particular implications for the knowledge production within society: "One of the consequences of this conceptualization of journalism is that journalism is seen not as a transmitter of knowledge but as a producer of knowledge. Observation of society results in media constructs, which represent a specific type of knowledge about the world that is influenced by the media logic." This is also true for innovation: journalism not only conveys information about innovation but acts also as a starting point for new innovation processes.

However, it seems that the role of media and journalism throughout the process of innovation and creativity is underrated and should be more thoroughly unpacked in terms of its (social) implications.

Conclusion and Future Directions

As innovation is a complex concept, different perspectives have to be considered in its definition. This contribution proposes to merge two different approaches to have a better understanding of innovation. As the barriers blocking cooperation between institutions belonging to different systems are reducing, a broader framework able to “bridge” the different systems is necessary. The crucial role of commercialization, collaborations, and communications leads toward systems theory as a good partner of and theoretical framework for the Helix models. Future research directions involve empirical tests to verify some of the trends suggested in the literature.

However, the existing scholarship presents shortcomings when it comes to the application of combined theoretical approaches such as the one presented in this entry. In order to overcome such limitations, the findings in this entry suggest that academia should broaden its scope of research to other fields. The combination of systems theory and the Helix models could contribute to rethinking some aspects of the process of “medialization” with respect to science. An increase in the orientation of science to the media, due to the close relationship of science to its social context, could be a very interesting avenue for future studies. Moreover, since medialization in science is often seen as a consequence of medialization in politics, research should also be extended to other areas such as politics or economy. Either way, more empirical research is needed – not only to “test” the theoretical implications stated in the article but to gain more detailed insights in the ongoing process of continuously overlapping and interpenetrating systems.

Cross-References

- ▶ [Creative Collaboration](#)
- ▶ [Creative Knowledge Environments](#)

- ▶ [Creativity and Innovation: What Is the Difference?](#)
- ▶ [Higher Education and Innovation](#)
- ▶ [University Research and Innovation](#)

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