



The Culture for Open Innovation Dynamics

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Abstract: Culture, in its various forms, has always been a critical driver of innovation. This paper focuses on generating some insights into the role of “culture for open innovation dynamics”. First, because the requirement to understand culture, which can control open innovation complexity, has been augmented, we want to answer the following research question in this study: How can we define or organize “culture for open innovation dynamics”, which can motivate open innovation dynamics, and control open innovation complexity? Second, we propose a concept model of culture for open innovation dynamics by reviewing the literature on the culture of firms in terms of their traits, organization, static innovation, and dynamic aspects regarding their innovation in entrepreneurship, and we validate said model through an indirect social experiment using the research results of 23 Special Issue papers. Third, the concept model of culture for open innovation dynamics is explained as the interaction between three different entrepreneurship dimensions: Entrepreneurship of novice entrepreneurs, intrapreneurship of employees of an existing firm, and organizational entrepreneurship by the firm itself. According to the balance of three sub-entrepreneurship types, culture for open innovation dynamics can have different aspects, namely, entrepreneurship leading culture for open innovation dynamics, intrapreneurship leading culture for open innovation dynamics, or organizational entrepreneurship leading culture for open innovation dynamics. This paper helps organizations and entrepreneurs to better understand the role that culture plays in boosting open innovation dynamics.

Keywords: culture; open innovation dynamics; entrepreneurship; intrapreneurship; organizational entrepreneurship

1. Introduction

1.1. Research Question

Open innovation means, on the one hand, the use of external knowledge sources to accelerate internal innovation and, on the other hand, the use of external paths to reach the internal knowledge market [1]. Open innovation is a holistic approach to innovation management by “systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels” [2].

From the philosophy of open innovation to open innovation culture, there is a need to conquer the inverted U-shaped curve of open innovation effects, which can also be called the open innovation paradox [3,4]. Currently, in the 4th Industrial Revolution, the dynamics of open innovation are rapidly

increasing with the explosion of the open innovation paradox, which also means open innovation complexity [5–8]. In this situation, the requirement to understand culture, which can control open innovation dynamics, is being augmented. Therefore, we want to answer the following research question in this study: How can we define or organize the culture for open innovation dynamics, which can motivate open innovation dynamics, and control the open innovation paradox or open innovation complexity?

“Culture” is derived, in a very roundabout way, from the past participle of the Latin verb *colere*, meaning to “cultivate,” and it draws some of its meaning from an association with the tilling of soil, which indicates a process of progressive refinement and breeding in the domestication of particular crops or even the result of the improvement of such a process [9]. Culture influences action not by providing the ultimate values toward which action is oriented, but by shaping a repertoire or “toolkit” of habits, skills, and styles from which people construct “strategies of action” [10]. It is possible that “culture for open innovation dynamics” will require a little more work than “the invention of culture.”

Nevertheless, as open innovation is becoming a dominant paradigm in the knowledge-based economy [11], the requirement of culture for open innovation dynamics, which can motivate open innovation dynamics itself and can decrease the cost of open innovation dynamics, also known as innovation complexity or the open innovation paradox, is in the rocket-shooting stage for firms, non-profits organizations, small and medium sized enterprises (SMEs), big businesses, and so on.

1.2. Research Scope and Methodology

The research scope and methodology used to answer this research question are as follows.

First, we reviewed the literature on culture, firm culture, (static) open innovation culture, and diverse related concepts such as entrepreneurship, intrapreneurship, and corporate entrepreneurship.

Second, we developed a concept model of “culture for open innovation dynamics” from literature reviews and thought experiments.

Third, we applied this concept model to 23 papers extracted from the analysis of papers from a Special Issue of Sustainability, the title of which was “Sustainability in 2nd IT Revolution with Dynamics Open Innovation,” to validate the concept of “culture for open innovation dynamics” in structure and meaning and the use the “contents analysis” method.

2. Literature Review and Research Framework

2.1. Culture as a Trait/Characteristic vs. Firm/Corporate/Organizational Culture

2.1.1. Culture as a Trait/Characteristic

It is the trope of our times to locate the question of culture in the realm of the “beyond.” The “beyond” is neither a new horizon nor the leaving behind of the past. Beginnings and endings may be the sustaining myths of the middle years. “Beyond” means a restless movement that has caught on so well here and there, on all sides, hither and thither, back and forth [12]. Anthropology is the study of man through the assumption of culture, a notion that includes the thoughts and actions of both anthropologists and their subjects as varieties of the same phenomenon. Because invention is indeed the most crucial aspect of our understanding of other cultures, this must be of central significance to the way in which all cultures operate [9]. If we agree that culture is a kind of invention, then it is also possible that impression management motives strengthen the association between prosocial motives and affiliative citizenship by encouraging employees to express citizenship in ways that both “do” and “look” good [13].

In evolutionary economics, altruism, which refers to behavior that reduces an actor’s fitness while enhancing the fitness of others (in other words, it is a special culture of economic behavior), increases the prospects of the group’s survival when in competition with other groups. In addition, because

of bounded rationality in evolutionary economics, the docility of economic agents contributes to the fitness of human beings. By doing what we have learned from those who surround us, not from our own experiences, social influences (as a special culture of economic behavior) generally offer us advice that is “for our own good,” along with the information on which this advice is based [14].

Recent works of sociology have been shifting to a more complex understanding of culture, depicting culture as fragmented across groups and inconsistent across its manifestations as complex rule-like structures that constitute resources that can be put to strategic use [10,15,16]. This means that many sociologists have come to reject the latent variable view of culture as coherent, integrated, and ambiguous in favor of representations of culture as a “toolkit,” “repertoire,” or collection of things that are heterogeneous in content and function [10,15].

With the rapidly developing and ever-dense network of interconnections and interdependencies that characterize modern social life and the various “flow” (such as the flow of capital, commodities, people, knowledge, information and ideas, crime, pollution, diseases, factions, and beliefs, images) across international boundaries, no longer is culture “tied” to the constraints of local circumstances. Globalization does not destroy localities: Cultural experience is, in various ways, “lifted out” of its traditional “anchoring” in particular localities [17].

Another big issue of culture is the “two cultures” of literary intellectuals and scientists. The non-scientists have a rooted impression that the scientists are shallowly optimistic, unaware of the human condition. On the other hand, the scientists believe that the literary intellectuals are totally lacking in foresight, peculiarly unconcerned with their brothers’ and sisters’ deep sense of anti-intellectualism, and anxious to restrict both art and thought to the existential moment [18]. Generally speaking, the scientific culture really is a culture, not only in an intellectual but also in an anthropological sense, because there are common attitudes, standards, and patterns of behavior, as well as common approaches and assumptions. The two cultures were already dangerously separate 60 years ago; the reasons for the existence of the two separate cultures are many, deep, and complex: Some are rooted in social histories, some in personal histories, and some in the inner dynamics of the different kinds of mental activities themselves [18].

Children born in the 1980s and 1990s, sometimes called Generation Y or Millennials, are accustomed to a culture of collaboration and sharing that differs from that of previous generations. Millennials are more likely to collaborate across time zones and geographic distances, and as consumers, they are more interested in services and experiences than in ownership. In professional arenas, large communities have emerged, frequently online, in which people collaborate, often with minimal or sometimes even without an exchange of direct economic value and without traditional hierarchical controls [19].

For the group that pursues the secrets of highly successful groups, culture is a set of living relationships working toward a shared goal—not something you are, but something you do. We sense group culture’s presence inside successful businesses, championship teams, and thriving families, and we sense when it is absent or toxic. A successful culture code consists of three components: (1) how signals of connection generate bonds of belonging and identity, (2) how habits of mutual risk drive trusting cooperation, and (3) how narratives create shared goals and values [20].

2.1.2. Firm Culture, Corporate Culture, or Organizational Culture

Culture helps explain firm performance, despite the lack of an agreed-upon definition, because scholars universally agree that culture is something largely shared by its members. It is a collective programming of the mind that distinguishes members of one organization from another based on shared values and norms. It is often the creation of the firm’s founders, even before members choose to adopt its values. Though definitions of culture are diverse, it is clear that culture is peculiar to a given organization, and its top-down values and shared assumptions are evident in the behavioral norms and common experiences of its members [21–24]. The constructive culture of a firm increases cooperation within organizational units in firms and coordination between organizational units in firms directly, and it can indirectly enhance the performance of a firm [21]. For example, the firm-level disclosures

of financial reports or supply chain management depend on the relative role of organizational culture [25,26]. A humanistic culture within a firm can have a positive effect on corporate social responsibility (CSR) [27].

The rise of research on organizational culture came about because Japanese firms were widely considered to have superior operating characteristics during the late 1970s and the early 1980s. The macro-analytic theories of organizational culture, which are mainly based on a functional logic reminiscent of the anthropologists Malinowski and Redcliffe-Brown, share a common attempt to understand the culture of a whole group or subgroup, the functions that culture performs in maintaining the group, or the conditions under which the group and its culture and subcultures develop. Micro-analytic theories of organizational culture present culture as something that resides within each individual and that can be understood through the cognitive processes of sense-making, learning, and causal attribution, or by probing the unconscious mind [28].

Creating a strong organizational culture is a powerful tool to influence employees' behavior and to improve performance. Human resource management (HRM) practices may have an impact on organizational culture, and the dominant culture may influence the HRM policy and practices adopted by organizations. Organizational culture is "a set of core values, behavioral norms, artefacts and behavioral patterns which govern the way people in an organization interact with each other and invest energy in their jobs and the organization at large" [29].

In relatively stable environments, firms with a strong culture have more reliable (less variable) performance, because the consensus surrounding organizational goals and values characteristic of strong-cultured firms enhances their ability to exploit established competencies. In volatile environments, however, the reliability benefits of strong cultures disappear. Organizational culture can be defined differently as "a system of shared values (that define what is important) and norms that define appropriate attitudes and behaviors for organizational members how to feel and behave." Strong cultures are defined as "a set of norms and values that are widely shared and strongly held throughout the organization" [23,30–32].

A firm's culture, which includes three attributes, fosters innovativeness and flexibility based on core values about how to treat employees, customers, suppliers, and others by way of improving employee morale or the quality of work-life, but it is also vital for improving a firm's financial performance. First, the culture must be valuable, because it must enable a firm to do things and to behave in ways that lead to high sales, low costs, and high margins or that add financial value to the firm in other ways. Second, the culture must be rare, so it must have attributes and characteristics that are not common to the cultures of a large number of other firms. Third, the culture must be imperfectly imitable, because firms without such a culture cannot engage in activities that will change their culture to include the required characteristics, and if they try to imitate a culture, they will be at a disadvantage compared to the firm they are trying to imitate [33].

The culture of entrepreneurial firms is generally characterized by external orientation and organic structure. It affects the firm's choice of outcomes, including organizational strategies and processes. Said culture displays key attributes as follows: (1) dynamic and risk-taking attitude, (2) innovative leadership style, (3) flexible and development-bonding mechanisms, and (4) proactive, ready to meet new challenges, with strategic emphasis [34–36]. Furthermore, though transactional leaders work within their organizational cultures by following existing rules, procedures, and norms, transformational leaders change their culture by first understanding it and then realigning the organization's culture with a new vision and a revision of its shared assumptions, values, and norms [24].

According to the basic perspective from the functionalist anthropological concept of culture, culture is a property of groups and can be thought of as the accumulated learning that a given group has acquired during its history. Culture can be thought of as a pattern of basic assumptions that is invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, is to be taught to new members as the correct way to perceive, think, and feel in relation to said problems. It has

three levels, as follows: (1) artifacts, which are visible, organizational structures and processes and are hard to decipher; (2) values, which are strategies, goals, philosophies, and espoused justifications; and (3) underlying assumptions, which are unconscious, taken for granted beliefs, habits of perception, thoughts and feelings, and the ultimate source of values and action [37].

2.2. *Static Aspects of Innovation Culture vs. Dynamic Aspects of Culture in Diverse Entrepreneurship*

2.2.1. Static Aspects of Innovation Culture

A cultural perspective on open innovation (which is influenced by the values of the company, or concrete artifacts such as incentive systems, management information systems, communication platforms, project decision criteria, a supplier evaluation list and its handling, and so on) that values outside competence and know-how is crucial for open innovation practices, because opening up the innovation process starts with a mindset [38]. Overcoming cultural barriers such as insufficient openness, aversion to risk-taking, organizational inertia, or not invented here (NIH) syndrome and having an organizational culture that motivates open innovation are included together in the study of static open innovation culture [39,40]. Studies that try to find the ideological and philosophical background of open innovation from Deleuze, Whitehead, Popper, or Taoism are also included in the static study of open innovation culture [3].

The renaissance bottega, the “ancestor” of today’s innovative co-working spaces, was an open culture crucible in which master artists were committed to teaching new artists, talents were nurtured, new techniques were developed, and new artistic forms came to light, with artists competing among themselves but also working together [41,42]. The economic operators in open innovation culture are socially adaptable people who give weight to incommensurable values, such as passions, dreams, and paranoia, and who thus favor the meeting ground between the precision of homo economicus and the imperfection of the romantically imaginative homo romanticus, who is homo innovatus, the bearer of the open innovation culture, because, in the agent of open innovation, economic rationality and imaginative anticipation coexist [41,43]. Various currents of thought make up the threads that weave the culture of open innovation, which includes transculturation, anti-discipline, and knowledge convergence: (1) the altruism attitude of water by Lao Tzu, (2) the multiplying of action by John Duns Scotus, (3) the inductive hypotheses by Francis Bacon, (4) the mind like a blank slate by John Locke, (5) the relations by David Hume, (6) the multiple alternative hypotheses by Paul Feyerabend, and (7) the combination of the physical, virtual, and mental aspects by Nonaka Ikujiro et al. [41].

According to another study, innovation culture, that is, static open innovation culture, has four facets: Market orientation, technology orientation, entrepreneurial orientation, and learning orientation. Open innovation culture belongs to the norms dimension, or the practices dimension, which is part of the shared basic values dimension. Open innovation culture consists of eight factors, as follows: Two norms that are the opposite attitudes of the NIH syndrome and the not sold here syndrome; four practices that are related to management support for open innovation, freedom to express doubts, organizational risk-taking, and technological opportunism; and two convergences of practices and norms that are about the open personality and open motivation of employees [44,45].

The culture of open innovation, in other words, a new twilight zone, is built on values such as curiosity, creativity, flexibility, and diversity, because the open dimension requires values such as openness, trust, responsibility, authenticity, and sustainability [46,47]. The key prerequisites of open innovation culture are (1) an altruistic culture with “capacity givers,” who form a bridge between brains for smart alliance-building or brain circulation, and (2) a cultural space for mind evolution that is based on, among other things, Zen cultural insights, because Zen precepts and practices can foster greater creativity in business people [3,48,49]. The fact that an increasing number of companies are involved in open innovation processes (OIPs) suggests that they have already developed an organizational open innovation (OI) culture; OI culture developed at the company level may serve to drive its development at the social and individual levels [50].

Innovation culture, which is a kind of static and open innovation culture, is a transdisciplinary culture with the aim to pragmatically integrate anything desirable, necessary, useful, feasible, and appropriate; innovation culture is mainly considered to be an aspect of organizational culture, where the societal innovation culture always sets the context [51]. Innovation culture has five characteristics: (1) vision, (2) network of knowledge, (3) inspiration and leadership, (4) Freiraume (which means room for ideas), and (5) creativity and risk-taking [52]. Another research study on sustainable business model innovation proposes seven factors that are triggers of business model innovation, namely, innovation culture factors, such as (1) redesign rather than stand still, (2) experimentation rather than turnaround, (3) service logic rather than product logic, (4) circular rather than linear economy, (5) alliances rather than solo-runs, (6) results rather than indulgences, and (7) three-dimensionality rather than one-dimensionality [53].

An innovation-oriented culture is a linchpin in product, service, and even business model innovation in firms. If a firm can possibly change specific cultural characteristics, it is able to take the role of a game-changing innovator and can achieve growth opportunities offered through emerging markets. There are three dimensions of an innovation-oriented culture: (1) shared values such as collective beliefs, (2) behavioral norms such as clearly expressed values within a firm's strategy formulation, and (3) visible practices or artifacts such as stories, rituals, or events (e.g., Henkel's yearly award ceremony, "Borrow with Pride," or the "3M's 15% program"), which support innovation within a firm [54].

2.2.2. Dynamic Aspects of Culture in Diverse Entrepreneurship

Entrepreneurship

Entrepreneurs gain profits, i.e., the premium put upon successful innovation in a capitalist society and its temporary nature, not by a static condition but through the process of creative destruction of new combinations, such as (1) the introduction of a new good, (2) the introduction of a new method of production, (3) the opening of a new market, (4) the conquest of a new source of supply of raw materials or half-manufactured goods, and (5) the carrying out of the new organization of any industry, such as the creation of a monopoly position [55]. All examples of these are related to dynamic culture motivation in the firm [56–58]. In a market in which contracts for labor are incomplete, the production function is not completely specified or known, and not all factors of production are marketed, by Schumpeterian or a new type of entrepreneurship, activities are necessary to create or maintain an enterprise where not all the markets are well established or clearly defined and/or in which the relevant parts of the production function are not completely known [59].

The dynamic culture-triggering role of the entrepreneur is not just limited to the creative destruction of Schumpeter, but is basically accepted by nearly all early theories of entrepreneurship, such as arbitrage and the bearing of risk and uncertainty, coordination of factors of production, or leadership and motivation [60]. Entrepreneurship can be defined as the creation of new businesses. "New" means businesses that do not exactly duplicate existing businesses, but that have some element of novelty [61]. Research on entrepreneurship through social networks must address the following concepts: (1) entrepreneurship is a process and must be viewed in dynamic terms rather than in cross-sectional snapshots, and (2) entrepreneurship requires linkages or relations between the key components of the process [62]. Similarly, another study defines entrepreneurial opportunities as situations in which new goods, services, raw materials, markets, and organizational methods can be introduced through the formation of new relationships between means and ends [63].

According to another definition of entrepreneurship that describes entrepreneurship as the entrepreneurial circling process of recognizing opportunities, acting and managing, reassessing the need for change, and conducting self-evaluation, entrepreneurship has dynamic aspects in that the entrepreneurial process is reiterative and emphasizes personal evaluation, planning, acting, and reassessment [64]. The definition that entrepreneurship is the creation of new organizations

shows the behavioral and dynamic aspects of culture [65]. In fact, venture emergence depends on the entrepreneur's dynamic willingness and ability to sustain temporal tension, bridging the interval between an evolving vision, current conditions, and ongoing development [66].

Intrapreneurship

Intrapreneurship is defined as entrepreneurship within an existing organization, referring to the emergent behavioral intentions and behaviors of an organization that are related to departures from customs. Intrapreneurship refers not only to the creation of new business ventures, but also to other innovative activities and orientations, such as the development of new products, services, technologies, administrative techniques, strategies, and competitive postures, although there is another perspective on intrapreneurship that focuses on the entrepreneurial individuals inside a corporation as a kind of entrepreneurial characteristic at the organizational level [67,68].

Intrapreneurship is not viewed as a state but as a process by which individuals inside organizations pursue opportunities without regard to the resources that they currently control, or as a process of doing new things to pursue opportunities with the spirit of entrepreneurship within the existing organization [69,70]. Intrapreneurship can be classified into four dimensions from this point of view as follows: (1) the new business-venturing dimension, which refers to pursuing and entering a new business related to the firm's current products or markets; (2) the innovativeness dimension, which refers to the creation of new products, services, and technologies; (3) the self-renewal dimension, which emphasizes the strategy reformulation, reorganization, and organizational change; and (4) the proactiveness dimension, which reflects the orientation of the top management in pursuing enhanced competitiveness and includes initiative and risk-taking and competitive aggressiveness, as well as boldness [71].

Intrapreneurship is the practice of developing a new venture within an existing organization through the entrepreneurial behavior of employees in established firms to exploit a new opportunity and to create economic value, which is opposite to entrepreneurship in that it involves developing a new venture outside an existing organization: Nascent intrapreneurs disproportionately commercialize new and unique opportunities that sell to other businesses, which is different from nascent entrepreneurs, who tend to leverage their general human capital and social ties to organize ventures that sell directly to customers [72,73]. Although intrapreneurship may not be the right environment for every corporate culture, successful intrapreneurs understand the environment, are visionaries and are flexible, create management options, encourage teamwork, encourage open discussion, build a coalition of supporters, and are persistent [74].

Intrapreneurship is regarded as a system in which individuals are involved in some form of entrepreneurial activity within an existing organization; these activities have seven dimensions: (1) new business venturing, (2) product and service innovativeness, (3) process innovativeness, (4) self-renewal, (5) risk-taking, (6) proactiveness, and (7) competitive aggressiveness [75]. Similarly, 10 conditions related to intrapreneurs have been put forward: (1) Coming to work with high excitement and willingness every day, (2) not allowing anybody to prevent their dreams, (3) preparing projects for work despite their not being necessary, (4) creating networks to help people, (5) constructing team spirit, (6) having a curiosity for inventions, (7) being dedicated to work and honesty, (8) being forgiving, (9) being a realist regarding goals, and (10) having a strong vision [76].

Corporate Entrepreneurship, Institutional Entrepreneurship, or Organizational Entrepreneurship

Corporate entrepreneurship (CE) can be defined as firm-level entrepreneurship, which has four forms: (1) sustained regeneration of corporate entrepreneurship, (2) organizational rejuvenation of corporate entrepreneurship, (3) strategic renewal of corporate entrepreneurship, and (4) domain redefinition of corporate entrepreneurship [77,78]. Hence, corporate entrepreneurship strategy is defined as a vision-directed, organization-wide reliance on entrepreneurial behavior that purposefully

and continuously rejuvenates the organization and shapes the scope of its operations through the recognition and exploitation of entrepreneurial opportunity [79].

Another definition of corporate entrepreneurship is “linking individual, renewal and frame-breaking entrepreneurship of corporate entrepreneurship”, which have four common attributes: (1) proactiveness, (2) aspirations beyond current capability, (3) team orientation, and (4) capability to resolve dilemmas [80]. Entrepreneurial firms are risk-takers, innovative, proactive, and have the entrepreneurial attitudes and behaviors of corporate entrepreneurship [81]. In fact, corporate entrepreneurship should be integrated into the organization’s culture in addition to strategy and management processes [82]. The definition of corporate entrepreneurship as “the process by which teams within an established company conceive, foster, launch and manage a new business that is distinct from the parent company but leverages parents’ assets, market positions, capabilities or other resources” proposes four CE models: The enabler, the producer, the opportunist, and the advocate [83].

In contrast to corporate entrepreneurship, institutional entrepreneurship is a political process characterized by contests for power between the relevant field-level participants, which involves the capacity to alter or create systems of meaning through the strategic use of symbols and language, as well as legitimacy, “a generalized perception or assumption that the actions of an entity are desirable, proper and appropriate within some socially constructed system of norms, values, beliefs and definitions.” Institutional entrepreneurship has three levels of institutional work: (1) opportunity recognition as micro-level institutional work, (2) design of a new organizational form as mezzo-level institutional work, and (3) legitimation of the organizational form as macro-level institutional work [84]. Institutional entrepreneurs are organized actors who envision new institutions as a means of advancing interests that they value highly yet are suppressed by extant logic because they are interest-driven, aware, and calculative [85].

Organizational entrepreneurship or organizational roles of entrepreneurship matter for at least two important reasons: (1) one’s ability to pursue a creative idea within the context of an existing organization is invariably affected by features of the organizational context; and (2) access to information about entrepreneurial opportunity largely varies by an individual’s position in the organizational structure, which affects their ability to learn about opportunities for entrepreneurship [86]. Entrepreneurship in organizations is also found from evidence from the popular music industry or the founding of the Paris Opera [87,88].

2.3. Trends of Culture Concerning Open Innovation Dynamics

According to the literature, the trends of firm culture are changing, as shown in Figure 1. Culture, in terms of traits or characteristics, is basically a static concept model that explains or evaluates the aspects of firms. Accordingly, this concept cannot be applied to any dynamic concept model that explains or evaluates any motivation in firms, such as creative destruction. The labels in Figure 1 denote the following situations:

- (a) Static culture, in terms of traits or characteristics, has evolved into entrepreneurship, which motivates constructive destruction, such as new start-ups as individuals. This means the evolution of the traits-based static culture concept model to the traits-based dynamic culture concept model.
- (b) Static culture, in terms of traits or characteristics, has expanded to organizations, such as firms or corporations. This means that the organization itself can have its own culture, which affects its behavior or system results. There is no evolution, only expansion of the concept model.
- (c) The static culture of the firm, corporation, or organization has evolved into organization entrepreneurship, institutional entrepreneurship, or intrapreneurship. Static but organizational culture can evolve into organizational entrepreneurship.

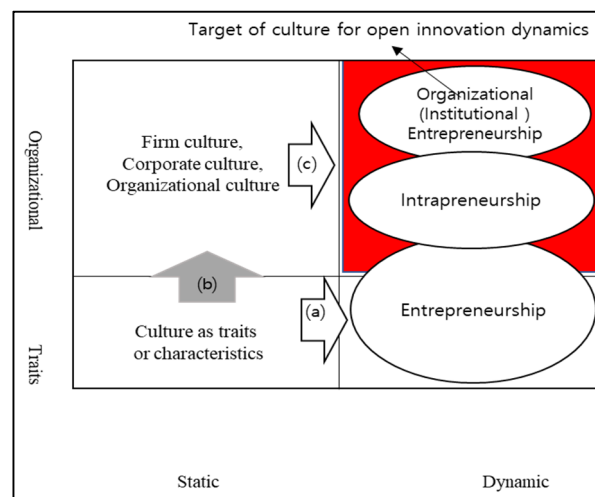


Figure 1. The trends of culture in the literature.

Intrapreneurship encompasses organizational and dynamic culture-based entrepreneurship, which motivates new organizations in existing corporates. However, in part, it is a duplicate of organizational entrepreneurship, in which the organization itself motivates new organizations, such as start-ups. Entrepreneurship is also partially a duplicate of intrapreneurship in that entrepreneurship sometimes starts as intrapreneurship in an ecosystem of an innovation cluster, taking Steve Wozniak and Steve Jobs in Silicon Valley as an example.

In sum, intrapreneurship is a dynamic culture and organization of employees in existing firm-based entrepreneurship. However, organizational entrepreneurship is a dynamic culture, as well as the organization itself in existing firm-based entrepreneurship.

As open innovation evolves from static open innovation to open innovation dynamics, the area of culture for open innovation dynamics also requires organizational culture with the dynamics depicted in Figure 1 [6–8,89–91].

3. A Concept Model of “Culture for Open Innovation Dynamics”

According to several studies on open innovation cultures that have proposed diverse traits or characteristics, there are no converging points. Thus, if we define open innovation culture as any traits again, it will just motivate the divergence of open innovation culture. Because open innovation motivates dynamics in the innovation and business model of existing firms, open innovation culture should be defined in a dynamic way. Additionally, a lot of studies on the diverse level of entrepreneurship in organizations explain the culture for open innovation dynamics. Therefore, it would be useful to define the concept model of “culture for open innovation dynamics” from the interaction of diverse entrepreneurship.

From the literature, we developed a concept model for “culture for open innovation dynamics,” as shown in Figure 2. Open innovation dynamics has two layers: (1) open innovation micro-dynamics, that is, open innovation–complex adaption–evolutionary change (OCE) dynamics; and (2) open innovation macro-dynamics, that is, market open innovation–closed open innovation–social open innovation (MCS) dynamics, as shown by the different flows of interaction in Figure 2 [6,8].

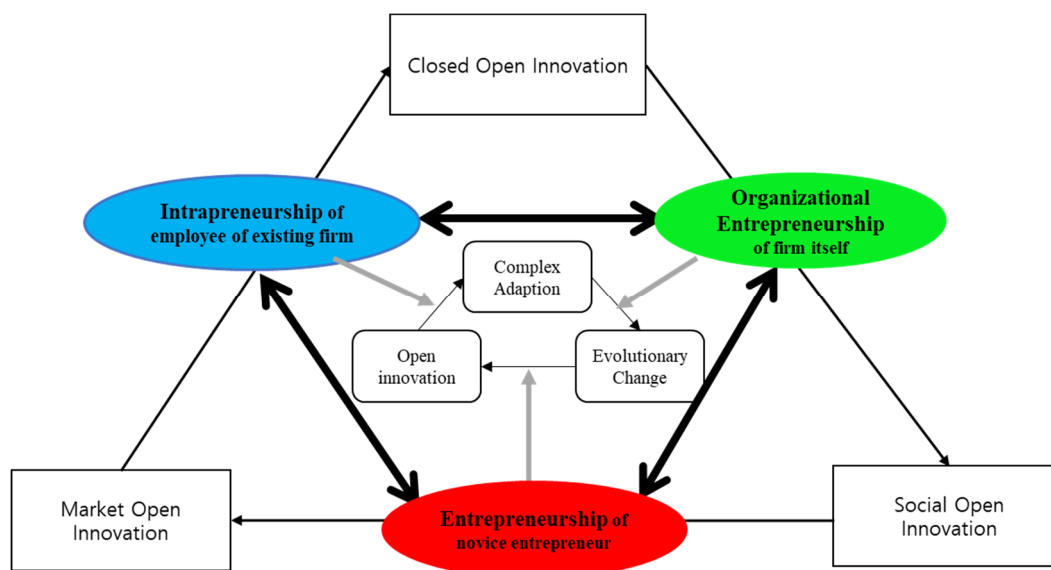


Figure 2. A conceptual framework of “culture for open innovation dynamics.”

First, entrepreneurship of the novice entrepreneur motivates creative destruction through a new combination or innovation. Therefore, entrepreneurship will motivate open innovation in open innovation micro-dynamics, because open innovation means a new combination of technology and the market across the boundary of firms. Entrepreneurs will be motivated to move from a new combination of society and technology to a new combination of technology and the market across the boundary of firms in open innovation macro-dynamics through new products or services, new markets, new processes, new organizations, or new materials.

Second, intrapreneurship by employees of existing firms will motivate new innovation in said firms. Thus, intrapreneurship will involve complex adaption in open innovation micro-dynamics, because intrapreneurship means a process by which individuals inside organizations pursue opportunities without regard to the resources that they currently control, while doing new things to pursue opportunities with a spirit of entrepreneurship within the existing organization. Intrapreneurs will increase closed–open innovation in open innovation macro-dynamics, that is, the new business-venturing, the increase in innovativeness, the self-renewal, or the proactiveness of existing big businesses that are mainly based on closed innovation but pursue strategic open innovation. At this step, managers, especially top managers, play a crucial role in intrapreneurship culture formation, as they embed and transmit culture in the thoughts, feelings, and behavior of the members of the organization. Managers have several primary “culture embedding mechanisms,” which include what they, as leaders, regularly pay attention to—namely, measure and control [92].

Third, organizational entrepreneurship by the firm itself will increase evolutionary change by altering or creating systems of meaning through the strategic use of symbols and language, as well as legitimacy, in addition to pursuing a creative idea and largely accessing information about entrepreneurial opportunity. From this, several secondary “culture articulation and reinforcement” mechanisms, such as organizational structure, systems and procedures, and formal statements of organizational values, philosophy, or creed, can play roles in culture formation for evolutionary change [29,92]. Organizational entrepreneurship, including corporate entrepreneurship, will motivate social open innovation by “linking individual, renewal and frame-breaking entrepreneurship of corporate”, which have common attributes, such as aspirations beyond current capability and the capability to resolve dilemmas.

In summation, the culture for open innovation dynamics in Figure 2 explores the economy as a non-linear, highly dynamic, ever-evolving complex system in open innovation micro-and macro-dynamics [41].

4. Diversity of Culture for Open Innovation Dynamics

4.1. Entrepreneurship Leading Culture for Open Innovation Dynamics

Culture for open innovation dynamics can be divided into three types according to the main entrepreneurship in the interaction model of three types of entrepreneurship, as illustrated in Figures 3–5.

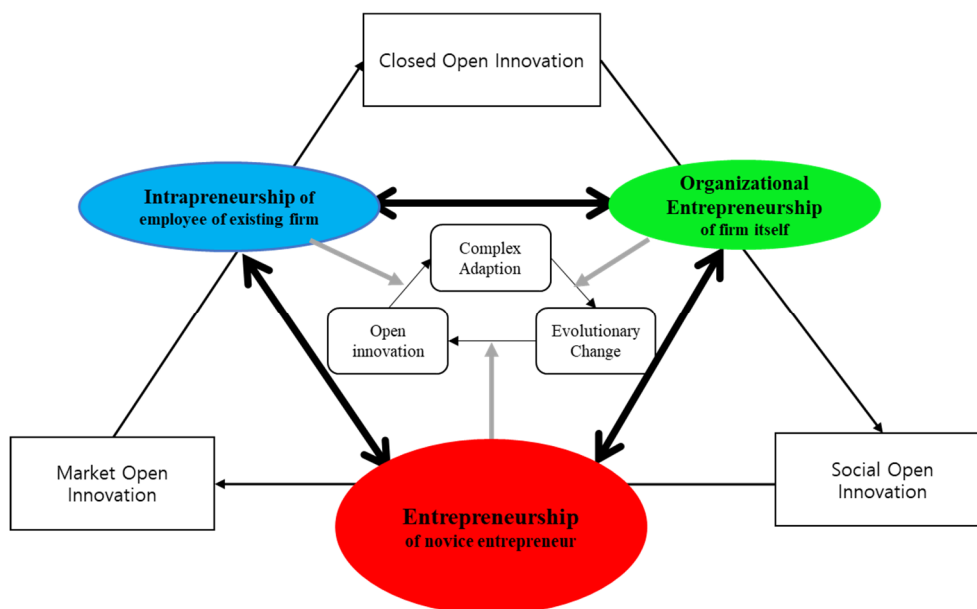


Figure 3. Entrepreneurship leading culture for open innovation dynamics.

First, the entrepreneurship leading culture for open innovation dynamics is popular among market open innovation-based start-ups or SMEs, as in Figure 3. In this type of culture for open innovation dynamics, firms try new business models of diverse and active open innovation, which are driven by novice entrepreneurs; examples include diverse implants by Mr. Park in Megagen Implant or Endless Wire Saw by Mr. Oh in Disec [93]. Even though this culture is very useful for firms in start-ups, it cannot be maintained once big business is reached, because it can trigger too great a complexity that cannot be controlled by the firm [94].

4.2. Intrapreneurship Leading Culture for Open Innovation Dynamics

Second, the intrapreneurship leading culture for open innovation dynamics is popular among closed–open innovation-based big businesses, such as Alibaba, Apple, or Google, as in Figure 4. In this type of culture for open innovation dynamics, firms set up diverse innovative mechanisms, such as the innovation lecture course in Alibaba, the 20% rule in Google, or the “Think Different” inner campaign in Apple, which are driven by existing big business for new intrapreneurship of the employees of existing firms [95]. This culture is needed to motivate the business model of big business sustainably, together with internal research and development (R&D) and open innovation dynamics.

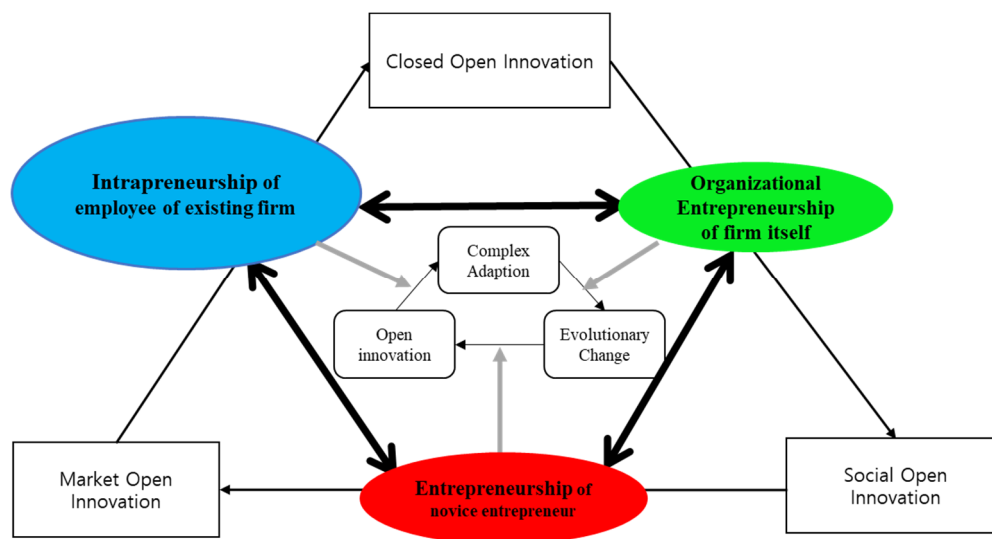


Figure 4. Intrapreneurship leading culture for open innovation dynamics.

4.3. Organizational Entrepreneurship Leading Culture for Open Innovation Dynamics

Third, the organizational entrepreneurship leading culture for open innovation dynamics is becoming the engine that triggers social open innovation, as illustrated by Hitachi in Japan, SK in Korea, and MS or other several Silicon Valley big businesses, as in Figure 5 [8]. In this type of culture for open innovation dynamics, firms build up diverse social innovation projects, social donation programs, or big social investment projects to tackle global humanity problems such as COVID-19 as the long-term-based organizational rejuvenation, strategic renewal, or domain redefinition of corporations. Hitach investment and donation for urban social innovation became the trigger of long-term business model innovation, while MS's donation to and investment in Burro Battery, which is a kind of energy social firm in Africa, will be a new trigger of the long-term organizational rejuvenation of MS [96,97].

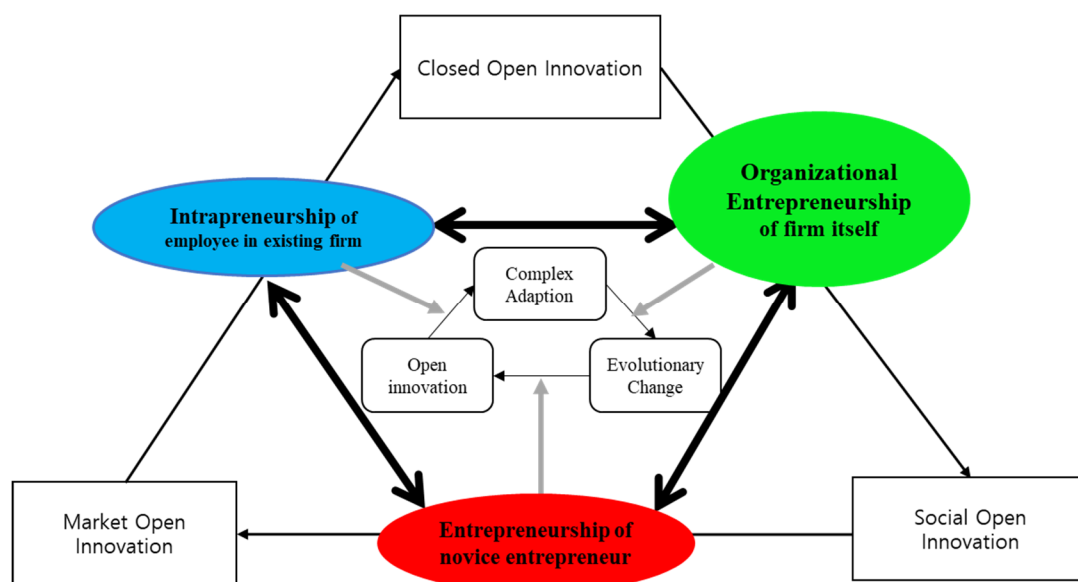


Figure 5. Organizational entrepreneurship leading culture for open innovation dynamics.

5. Contributions of the Special Issue: Culture for Open Innovation in Special Issue Papers

In the Special Issue of Sustainability for Society of Open Innovation: Technology, Market, and Complexity (SOI) 2019, 23 papers were published with the theme of “Sustainability in 2nd IT Revolution with Dynamic Open Innovation.” By matching the open innovation dynamics in these 23 papers with the concept model, “culture for open innovation dynamics” could be indirectly validated. Validation of a concept model by applying it to papers is possible, as research results can be considered a kind of indirect social experiment of participant observation [98]. Below, we highlight the contributions of the 23 papers.

First is a paper that analyzes how the direction of mobility and the human assets of mobile engineers affect joint knowledge creation after merger and acquisition (M&A), and it shows the entrepreneurship leading culture for open innovation dynamics in Figure 3 through dynamics from open innovation to evolutionary change. The themes include the integration of universities and business in the digital age and the M&A case of Samsung [99–101].

The second paper is on collective intelligence, which is an emerging world in open innovation in the 4th Industrial Revolution, as well as the growth limits of capitalism, and is related to the organizational entrepreneurship leading culture for open innovation dynamics in Figure 5 [5,89,102].

The third paper explores the mechanism of the impact of the board power hierarchy on green governance performance through the influence of green governance conduct, and reflects the organizational entrepreneurship leading culture for open innovation dynamics in Figure 5. It additionally focuses on green regional innovation policy and the notion of taking advantage of its emergence for complex innovation ecosystems [103–105].

The fourth paper analyzes the influence of a firm’s capability and the dyadic relationship of the knowledge base on ambidextrous innovation in biopharmaceutical M&As, and is related to the intrapreneurship leading culture for open innovation dynamics in Figure 4. In addition, it addresses the systems thinking perspective and the integration of exploration and exploitation [106–108].

The fifth paper investigates sustainable technology innovation path recognition by an evaluation of patent risk in international trade, and is related to entrepreneurship leading culture for open innovation dynamics. Determinants of the priority of license fees and new product development strategy are other areas of discussion [109,110].

The sixth paper researches the relation between open innovation and serial entrepreneurs based on entrepreneur leading culture for open innovation dynamics, in addition to the implementation of open innovation in research and technology organizations in the context of Smart City 4.0 [94,111,112].

The seventh study work shows the ambidexterity in external knowledge search strategies and innovation performance with the entrepreneurship leading culture for open innovation dynamics in addition to the perspective of demand-side open innovation [113,114].

The eighth paper analyzes the effect of innovative capability on business performance in information technology (IT) and business service companies, which is related to entrepreneur leading culture for open innovation dynamics, in addition to global innovation networks and territorial innovation systems [115,116].

The ninth paper explores how emerging-market multinational enterprises (EMNEs) from emerging markets are upgrading their operations in their home countries, driven by the transformation of subsidiaries in host countries, which is related to organizational entrepreneur leading culture for open innovation dynamics, in addition to innovation capability [117,118].

The 10th paper analyzes how social entrepreneurs’ value orientation affects the performance of social enterprises in Korea, which is related to entrepreneur leading culture for open innovation dynamics, in addition to quaternary innovation strategy [119,120].

The 11th paper analyzes the sustainable development of land-lost peasants’ citizenization, that is, compulsory urbanization, in China, which is related to organizational entrepreneurship leading culture for open innovation dynamics, in addition to smart cities and automated driving systems [121–123].

The 12th paper proposes the four-stage platform growth model, which is related to intrapreneurship leading culture for open innovation dynamics in the 4th Industrial Revolution [5,124].

The 13th paper analyzes factors that influence the matching of ride-hailing services using a machine learning method, which is related to intrapreneurship leading culture for open innovation dynamics, in addition to the socio-economic benefits of the sharing economy [125,126].

The 14th paper explores enablers of strategic orientation for technology-driven business innovation ecosystems, which is related to organizational entrepreneur leading culture for open innovation dynamics, in addition to the effects of entrepreneurial orientation [127,128].

The 15th paper analyzes the structural holes in the multi-sided market of China's car-hailing platform, which is related to organizational entrepreneurship leading culture for open innovation dynamics [129].

The 16th paper analyzes trendsetting, cultural awareness, cultural receptivity, and future orientation among the young generation of Chinese college students, which is related to entrepreneur leading culture for open innovation dynamics, in addition to brand relationships [130,131].

The 17th paper explores sustainable tourism in the open innovation realm using bibliometric analysis, which is related to organizational entrepreneurship leading culture for open innovation dynamics, in addition to innovation through competition [132,133].

The 18th paper is about bridging the gap in the technology commercialization process by using a three-stage technology-product-market model, which is related to entrepreneurship leading culture for open innovation dynamics, in addition to marketing innovation and users' continuous intentions [134–136].

The 19th paper analyzes the efficiency of zinc-refining companies, which is related to entrepreneurship leading culture for open innovation dynamics, in addition to the triple helix and the efficiency of east Asian zinc smelters [137–139].

The 20th paper analyzes the managerial dimension of open data success, with a focus on the open data initiatives in Korean local governments [140].

The 21st paper analyzes how technology start-ups increase innovative performance, with a focus on employment change in Korea, which is related to entrepreneur leading culture for open innovation dynamics, in addition to manufacturing firms in Southeast Asia [141,142].

The 22nd paper analyzes factors that influence the usability of rehabilitation robotic devices for lower limbs, which is related to organizational entrepreneurship leading culture for open innovation dynamics, in addition to the identification of stakeholders [143,144].

The 23rd paper analyzes social trust and open innovation in an informal economy with the emergence of Shenzhen's mobile phone industry, which is related to organizational entrepreneurship leading culture for open innovation dynamics, in addition to open innovation systems in developing countries [145,146].

6. Conclusions

6.1. Implications

This study organized the culture for open innovation dynamics through a comprehensive literature review on the culture traits in firms, firm-level culture, static open innovation culture, and the dynamic aspects of firm culture in diverse entrepreneurship. Culture for open innovation dynamics is the result of interactions among entrepreneurship, intrapreneurship, and organizational entrepreneurship.

First, because this concept model was developed from well-accumulated dynamic culture aspects of diverse entrepreneurship, there is no need to also define culture for open innovation dynamics.

Second, the concept model of culture for open innovation dynamics can be applied to open innovation micro-and macro-dynamics together.

Third, according to the differences between the three types of entrepreneurship, diverse conditions of culture for open innovation dynamics can be motivated according to the situation of firms.

Fourth, establishing a culture for open innovation is critical not only for the industry, but also for cities and societies [147,148]. In the age of climate change, natural disasters, and pandemics, it is critical to rethink how we are going to build our cities on the basis of smart and sustainable development principles [149,150]. In this regard, a cultivating environment for open innovation is needed in our cities to restructure them as smart and sustainable cities [150,151]. This paper sheds light on the role that culture plays in boosting open innovation dynamics that companies, societies, and cities will benefit from.

Lastly, culture for open innovation dynamics is also important in the realization of true open innovation in public organizations, because they have to conquer cultural barriers in addition to legal and institutional barriers. Rigorous regulations and extensive bureaucratic procedures within the public sector may prevent public organizations from promoting various collaborations with external organizations. Enhancing the culture of multi-actor collaboration in the public sector will allow public agencies to more actively collaborate with external parties [152]. Culture for open innovation in the public sector should embrace efficient, equitable, and accountable values, because open innovation in public administration could be used to explore collective action problems and to reveal how to solve them [153].

6.2. Limitations and Future Research

The concept model of culture for open innovation dynamics was only preliminarily validated by the method of indirect participatory observation research by applying it to 23 Special Issue research papers. Therefore, above all, diverse case studies of culture for open innovation dynamics are required first and foremost.

Second, the value of the concept model of this research should be increased by performing a lot of additional field research, which could lead to fascinating results.

Third, building on Henry Chesbrough's proposal to carry out research on open innovation culture, this paper is another attempt to develop the theory of open innovation culture. Diverse approaches to develop the theory and cases of open innovation culture should be allocated as future research goals.

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