Chapter 1

Digital Entrepreneurship Ecosystem as a New Form of Organizing: A Case of Zhongguancun

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Abstract

Digital entrepreneurship ecosystem (DEE) plays a significant role for generating digital innovations because it contains variable resources and facilitates the collective collaborations. Many regions have established the DEE to support digital innovations in order to improve their economic environment. However, researches on digital innovation at ecosystem level are limited. In addition, the knowledge about “how to organize DEE” is inadequate. To unveil the organizing forms of DEE, we consider DEE as a “new” form of organizing for the absence of traditional organizing elements such as hierarchy and formal authority. Through

this theoretical lens, DEE can be analyzed as an organization, rather than a combination of actors. Empirically, we conducted a case study of Zhongguancun (ZGC), a successful DEE in China, and interviewed 51 heterogeneous people. We found that eight activities compose the organizing form of DEE.

Keywords: Digital entrepreneurship, Ecosystem, New forms of organizing.

Introduction

Since digital innovation becomes a critical factor to gain firms' competition, it is common that digital innovations mainly take place within firms, rather than in competitive market (Autio *et al.*, 2015). However, digital innovation also takes place outside the boundary of firms through collective collaboration, which complements the resources limitation of single firm (Adner and Kapoor, 2010). Thus, we need to treat digital innovations at the ecosystem level, which could provide a platform to aggregate various resources and facilitates such collaboration (Lindgren *et al.*, 2008). In practice, digital entrepreneurship ecosystem (DEE) has already been complimented to accelerate digital innovations, such as Silicon Valley. Many regions also started to establish DEEs to support digital innovations as a means to revive local economy, such as London, Berlin, Paris, Tel Aviv in Israel, Singapore, and China (Herrmann *et al.*, 2015; McKinsey Global Institution, 2015; Yip, 2015).

Therefore, DEE plays an important role as an accelerator for creating digital start-ups. Currently, however, researches on digital innovation at the ecosystem level are limited, which hampers our understanding of DEEs (Shen *et al.*, 2015). To illustrate, existing research on digital innovation mainly focuses on individual, organizational, and industrial levels (Bharadwaj *et al.*, 2013; Sambamurthy *et al.*, 2003; Yoo *et al.*, 2010). Even those research in the ecosystem context has mainly addressed organizational or industrial activities within the ecosystem (Lee and Berente, 2011; Selander *et al.*, 2010). Given this urgent, *Information System Journal* (ISJ), the top journal in IS literature, calls for papers on unveiling the characteristics of digital entrepreneurship in a wide context (Shen *et al.*, 2015, p. 1).

Contrary to the traditional thinking of organizing, many DEEs can organize variable actors well without formal authority. However, the knowledge about “how does DEE organize” is inadequate, posing a great knowledge gap for both scholars and practitioners. Different from traditional organizations, actors in DEE do not share the same goal and are free to make their decision based on their own goals and benefits, which may lead to the conflicts rather than collaboration. For example, the actors may prefer to drain the value within the ecosystem for maximum of their benefit, rather than share it with other actors. Therefore, exploring the details of organizing processes that facilitate inter-organizational coordination and collaboration is a worthy research point (Gulati *et al.*, 2012).

Thus, our study aims to analyze the DEE as a whole to answer the question “how does a DEE organize to support digital innovations.” In order to answer this question, we adopt the theoretical lens of forms of organizing (Puranam *et al.*, 2014), in which the four universal problems — problems of task division, task allocation, reward distribution, and information flow — have to be addressed. Since DEE is different from the traditional form of organizing for lack of traditional organizing elements such as formal authority, the solutions to these four problems may be novel (Puranam *et al.*, 2014). Thus, the organizing process of DEE is relatively novel and we can treat DEE as a “new” form of organizing. This theoretical lens enables us to analyze DEE as an organization rather than a pure combination of actors. These universal problems of organizing provide us with an operational framework to analyze the organizing activities in DEEs.

We conducted a case study on Zhongguancun (ZGC), a successful DEE known as the Silicon Valley of China. Analyzing data collected from 51 interviewees with high heterogeneity, we find eight activities to achieve the organizing form of DEE. Our chapter has three contributions. First, we contribute by extending the research on digital innovation from individual or organizational level to an ecosystem level by analyzing the DEE as a whole (Shen *et al.*, 2015). This is because the DEE is conducive to digital innovation exploitation since it aggregates various resources and facilitates inter-firm collaboration. Second, our chapter makes contributions by complementing the design study of organization through the case exhibition of DEE as a new form of organizing (Gulati *et al.*, 2012; Puranam

et al., 2014). Finally, our chapter contributes to the entrepreneurship literature by unveiling the organizing processes of an entrepreneurial ecosystem (Autio *et al.*, 2015).

Literature review

Digital innovation and DEE

According to the Yoo *et al.* (2010), digital innovation can be defined as the implementation of new combinations of digital and non-digital components to produce novel products and processes. Due to the limitation of resource and knowledge available within individual organizations, many firms seek to leverage external resources to generate digital innovations (Selander *et al.*, 2010). Meanwhile, the collaboration networks of inter-firms (Schilling and Phelps, 2007) and boundary-spinning practices (Lindgren *et al.*, 2008) have significant effect on innovations. Thus, digital innovation typically involves multiple actors and interactions. In other words, ecosystem which contains variable resources and information is significant for digital innovations.

Innovation and entrepreneurship are inherent (Bessant and Tidd, 2007) since many digital entrepreneurship are based on digital innovations and also create digital innovations. Meanwhile, the DEE is important for the success of digital entrepreneurship for the integration of resource and supportive element beyond the firm level (Spigel, 2015). Yet, research on digital entrepreneurship at the ecosystem level is limited. Most of them focus on individual and organizational levels, in which entrepreneurial process and context are the main research points (Shane and Venkataraman, 2000; Zahra *et al.*, 2014). Other researches on digital entrepreneurship at a wide context are clusters (Delgado *et al.*, 2010) and networks (Nambisan and Sawhney, 2011). Although these researches have different perspectives, they share a common ground that a macro scope is needed to understand the strategy of digital entrepreneurship (Spigel, 2015). Thus, the term “ecosystem” became popular in the digital entrepreneurship literatures.

For the underdevelopment and undertheorization of ecosystem, a tool or framework is needed to analyze the ecosystem structurally (Autio *et al.*, 2015; Spigel, 2015). Because agents within the ecosystem

are legally independent entities, it is straight to consider ecosystem as a multi-organizational problem, as most researches did. Nonetheless, the conception of “meta-organization”, in which firms or individuals are not bound by formal authority, based on employment relationships (Gulati *et al.*, 2012), enables us to involve the framework of organization theory to analyze ecosystem. In order to unveil the black box of DEE’s organizing process, we adopt the framework of form of organizing. Details will be shown in the next section.

Forms of organizing

There are two fundamental problems of organizing: the division of labor and the integration of effort (Puranam *et al.*, 2014). According to the research of Puranam *et al.* (2014), the problem “division of labor” can be divided into two sub-problems: task division and task allocation; the problem “integration of effort” can also be described as reward provision and information flow (summarized in Table 1).

Task division refers to *the problem of mapping the goals of the organization into tasks and subtasks* (Puranam *et al.*, 2014, p. 165). It describes the problem of how to breakdown the system goal into contributory subtasks in an organization. In other words, it decides what jobs the system has. For task division, Puranam *et al.* (2014) argued that the following three principles should be relevant: excluding members who do not fit in the system goal, no essential tasks remaining incomplete, and little redundancy among subtasks. These principles can be achieved by the initial design (MacCormack *et al.*, 2006), the participation and contribution by members (Puranam *et al.*, 2014), co-specialization of members (Thomas and Autio, 2012) and the transparency of task division (Baldwin and Clark, 2006).

Task allocation refers to *the problems of mapping the tasks obtained through task division to individual agents* (Puranam *et al.*, 2014, p. 165). It describes the problem of how to allocate a job to the right one. The common mechanisms of task allocation are assignment (Hackman and Oldham, 1976) and self-selection based on capability, resource, and preference (Puranam *et al.*, 2014). The process of self-selection can be

Table 1. Summary of Forms of Organizing

Fundamental Problems	Description	Example of Solutions
Task Division	The problem of mapping the goals of the organization into tasks and subtasks	<ul style="list-style-type: none">✓ Initial structure designed by founder (MacCormack <i>et al.</i>, 2006)✓ Participation and contribution by other members (Puranam <i>et al.</i>, 2014)✓ Transparency of task division (Baldwin and Clark, 2006)
Task Allocation	The problems of mapping the tasks obtained through task division to individual agents	<ul style="list-style-type: none">✓ Assignment (Hackman and Oldham, 1976)✓ Self-selection based on internal factors (Puranam <i>et al.</i>, 2014)✓ Self-selection based on external factors such as competition
Reward Distribution	The problem of mapping a set of rewards to the agents in the organization and motivating the agents to cooperate	<ul style="list-style-type: none">✓ Compensations (Prendergast, 1999)✓ Intrinsic motivation (Hackman and Oldham, 1976)✓ Social norms (Shah, 2006);✓ Value creation (Thomas and Autio, 2012)✓ Culture as a tool kit (Spigel, 2015)
Information Flow	The problem that an organization's agents have the information needed to execute their tasks and coordinate actions with others	<ul style="list-style-type: none">✓ Physical collocation (Puranam <i>et al.</i>, 2014)✓ Virtual tools (Puranam <i>et al.</i>, 2014)✓ Conference (Garud, 2008)

considered as decision making, which can be influenced by both internal and external factors. Competition is an external factor for an organization, but it is also a critical factor for a successful ecosystem (Moore, 1993; Peltoniemi and Vuori, 2004). Therefore, the self-selection based on competition is also a pattern of task allocation.

The distribution of rewards refers to *the problem of mapping a set of rewards to the agents in the organization — in order to motivate the agents to cooperate by taking costly actions toward executing the tasks they have been allocated* (Puranam *et al.*, 2014, p. 165). It mainly solves the problem of how to motivate agents to enter in and pay effort to achieve tasks. Under the employment contract, compensation is the main mechanism of reward distribution (Prendergast, 1999). As for the motivation problem, intrinsic motivation is also important for motivating employees to pay effort on tasks (Hackman and Oldham, 1976), especially in the new forms of organization where the employment contract is missing. The value logic of ecosystem provides agents in ecosystem with opportunities to capture and co-create values (Thomas and Autio, 2012). This value creation attracts agents to join into the ecosystem and ensures the fair distribution of rewards. Reward distribution can also be enhanced by social norms (Shah, 2006) and culture (Spigel, 2015; Swidler, 1986).

The information flow refers to *the problem that an organization's agents have the information needed to execute their tasks and coordinate actions with others* (Puranam *et al.*, 2014, p. 166). It constructs the linkages among agents to the integration of their efforts. Physical collocation and virtual tools are the common channels to achieve information flow (Puranam *et al.*, 2014). For a community, a conference plays a significant role as the prime venue for information exchange and interaction (Garud, 2008).

Methodology

ZGC is selected as the case to research because it is a successful DEE and data collection is relatively convenient for geographic proximity. Since establishment in June, 2014, ZGC has attracted about 40 service providers to join in, including venture capitals, accelerators, universities, and mentors. In addition, about 400 third-party organizations provide service to support digital entrepreneurship. More than 2,000 entrepreneurial teams were incubated in ZGC and some of them have grown to big companies whose value was estimated to be more than 10 billion.

This study follows the interpretive case study methodology (Klein and Myers, 1999). Our analysis unit is the DEE. Three phases were conducted in this study.

The first phase was the preparation part, which started in December 2014. In this phase, second data about ZGC and entrepreneurship development in China were widely obtained and analyzed (for detail information, refer to Appendix B, Table B.1). Then some elite interviews were conducted. We fortunately got the interview permission of the deputy head of Zhongguancun Administrative Committee (ZAC). ZAC is a government department in charge of development and construction of ZGC. Later, interviews were conducted among some main accelerators. After analyzing the data, a big picture was shown about the ZGC and its contexts of China's digital entrepreneurship boom. This analysis also revealed some details about the construction and relationship of members in ZGC. Organizations and individuals were independent legally, which means that there was no employment relationship among them. This finding is also confirmed in the next phase of study.

The second phase was extensive data collection, which started in April 2015. In the phase, semi-structured interviews were extensively conducted in ZGC. After excluding some low-quality interviews (such as irrelative interviews, and stopping in the early stage because of contingency), 51 unique interviews were conducted in total, including digital entrepreneurs, infrastructure managers, government officers, accelerator staffs, venture investors, and service providers (for more information, refer to Appendix A, Table A.1). Each interview lasted more than 45 minutes and was conducted by at least two researchers. These interviews yielded 472 pages of transcripts and notes. In order to get a deep understanding of ZGC and access more interviewees, one of our researchers joined in an accelerator as an intern for 4 months (from May to August 2015).

The third phase was data analysis, which started in August 2015. The techniques of open coding and selective coding were used to systematically analyze data (Corbin and Strauss, 1990). Combining literature review, the findings are identified and supported.

To ensure reliability and validity of data collection and analysis, some methods were applied simultaneously. To achieve reliability in data collection, data were implemented and triangulated by interview variety members

from system architect to individual participant. Combining secondary data (such as news, websites, and government documents) and interview data also enhanced the reliability of data and findings. In order to achieve validity, at least two researchers were involved during both data collection and analysis. We present our analyzing process and findings to other researchers to get feedback and consequently enhance the validity of our findings.

Task division

In the ZGC, task division is accomplished through (1) the category design by architect and (2) co-specialization within participants.

In the early stage of ZGC, the main tasks are designed by the architect, which is considered as high-centralized process (Gulati *et al.*, 2012). When designing the DEE, a system-level goal is essential. This goal is a kind of guidance for the system. Tasks divided into details have to support to achieve this goal. As the team of architects of ZGC has experience in establishing an entrepreneurial accelerator in Silicon Valley, the structure of Silicon Valley as a DEE was imitated and imported into ZGC. Thus, the main categories of jobs were designed such as acceleration centers, venture capitals, entrepreneurial mentors, education resources, and physical infrastructures (including collocation places, telecommunication facilities, transportation infrastructure, and security protection). As an officer who participated in the designing process of ZGC stated, “*in the initial stage of this project, we design the main structure of ZGC, in which some specific members are necessary, such as accelerate centers, venture capitals, collocation places and so on.*”

This high-centralized process of design decides what kinds of work ZGC as a DEE provides. The visibility of the system goal and category makes it possible to attract agents who own ability to achieve it (Baldwin and Clark, 2006). To some extent, the irrelevant members are excluded through the visibility and definition of categories of ZGC. For example, agents who aim to work for entrepreneurship would be attracted by the visible goal, while others unrelated with entrepreneurship would not be interested in ZGC.

Therefore, task division is achieved through *category design by an architect*.

Although the architect has the ability to design the main category of task in the early stage, the details of the subtask division in ZGC still need to be explored. “*Although we have experience on entrepreneurial service in Silicon Valley, the detail structure of the entrepreneurship system is still needed to be explored. Meanwhile, because the context of ZGC is quite different from Silicon Valley, we cannot copy the pattern of Silicon Valley directly*”, an officer participating in the design work of ZGC stated. But with more and more participation and contributions, the task division can be elaborated and developed by itself (Puranam *et al.*, 2014). Therefore, after designing the main category of tasks, the architect imported heterogeneous agents into ZGC through some reward distributions such as subsidies to enable the complementariness of task division (Thomas and Autio, 2012), which was a low-centralized process.

At this stage, heterogeneous agents with specialized resources and abilities cooperate, which overcome the lack of resource limitation of individuals and also complement the subtask division by achieving the demands of others. These subtasks are not designed by an architect. For instance, some agents find that some entrepreneurs have a problem to convert the innovation idea to entrepreneurship business, and thus they established a small industry to solve this problem. These agents have specific experience and ability to solve this problem but lack innovation ideas, while entrepreneurs have innovations, some of them lack the ability to achieve them. Therefore, co-specialization within participants complements the subtasks which are not designed and enhances the completeness of task division.

Thus, task division is achieved through *co-specialization within participants*.

Task allocation

The pattern of task allocation is close to the task division because it has to solve the allocation problem based on the task division (Puranam *et al.*, 2014). In the early stage of ZGC, category design is the main method of task division. Correspondingly, methods of task allocation should suit the design process, similar to the co-specialization process. In ZGC case, we found that task allocation is accomplished through (1) captain assignment

by architect and (2) self-selection based on competition, which correspond to the methods of task division.

At the early stage of ZGC, in order to get the premium and appropriate resources, a competitive bidding mechanism was involved to select and allocate elite members. In this mechanism, the tasks were assigned to the members who owned adequate and appropriate resources to achieve the tasks.

Agents that are assigned to certain tasks or categories can be considered as project leaders, or board managers in an open community. In the ZGC, we call them “captains.” Because these captains have premium resources and social reputations, they can build their own authority and manage this category well to support the system-level goal. For instance, a big IT company in China is assigned to be the captain of category of hardware-related entrepreneurship. This company leverages both internal and external resources to build an environment that facilitates the hardware-related innovation and entrepreneurship. These innovations and entrepreneurship are also beneficial for this company because they are related to the industry of this company and also enhance the agility of company through the accessible innovation from outside. As we can see, these captains have the ability to manage their category well and are also beneficial with the development of category (which solve the motivation problem). This high-centralized process of assignment ensures the main tasks (or categories) to be allocated to the right agent to achieve them.

Therefore, task allocation is achieved through *captain assignment by architect*.

In the second phase, when captain members have been confirmed, self-selection becomes the dominating factor of task allocation. Self-selection is based on the task division of co-specialization, which is a low-centralized process. Heterogeneous agents cooperating to achieve co-specialization have to base on the willingness of each other, in which any other high-centralized allocation processes (such as assignment) are not involved. Meanwhile, for the self-organizing nature of ecosystem (Moore, 1993), the main method of task allocation in ZGC as a DEE is self-selection (Gulati *et al.*, 2012; Puranam *et al.*, 2014). As one of the entrepreneurs stated, “*most service providers in ZGC are open to everyone, and we can choose them based on our interests and willingness.*”

To the contrary, these service providers also have right to choose you based on their interests.”

Therefore, task allocation is achieved through *self-selection based on competition*.

Reward distribution

Reward distribution solves the problem of motivation to join in the system and to take effort to achieve the tasks. In ZGC case, the motivation problem is achieved through (1) value co-creation and (2) entrepreneurial culture as a toolkit.

Many tangible rewards are found to attract agents to join in ZGC, such as subsidies from government, low renting fee, and other policies. These tangible rewards may have positive effects on attraction members, but according to our investigation, these tangible rewards are not the main reason to attract people to join in. As an entrepreneur who is an overseas returnee stated, *“Subsidies in ZGC are not so attractive to entrepreneurs because any other place could provide same, or even better rewards. Policies about entrepreneurship are much more complex than some foreign countries.”*

Many agents come to ZGC mainly for the commercial opportunities, while policies and subsidies are supportive to their willingness to join in. Opportunities comes from the process of this system in which value can be captured and created by any other participants (Thomas and Autio, 2012). Since the resources and capabilities of individuals are limited, many agents join in the ecosystem to seek the partners to cooperate in order to capture and create values. Thus, it is a process of value co-creation. For instance, some law service providers capture the value of law service in entrepreneurship process, and they cooperate with other service providers such as acceleration centers and collocation places to create value through solving law problem of entrepreneurs. The value co-creation also occurs at the individual level, which is attractive to the digital entrepreneurs. Many entrepreneurs come to ZGC for information exchange and contestation of innovation ideas. During the process of exchanging and contestation, the ideas have been enhance and even become more valuable for combination of other innovation ideas.

The value co-creation provides with the reward to the agents who pay effort for it. This reward is distributed through the mechanism of pay-by-effort, which is like the mechanism of the commercial market. Thus, this distribution process is fair and free-riding problem which is the main concern of the open community (Puranam *et al.*, 2014) that doesn't exist. At least in the ZGC case, no evidence is found that free-riding has been paid attention to fix it. As for the problem of stealing innovation ideas, since the resource-based views are widely accepted by people, entrepreneurs, never worry about that because they believe that they have unique resources to achieve their ideas, while others cannot do as well as them. As one entrepreneur explained, *"I never worry about the problem of idea copying, because I have unique resources to achieve my idea which others cannot copy. In contrast, I will be glad if my idea is copied by others. It means that my idea is valuable and worthy to be achieved."*

Therefore, reward distribution is achieved through *value co-creation*.

The other factor that enhances the reward distribution is supportive culture. Culture provides repertoire of shaping actions of people, just like "tool kit" in which habits, skills, and styles construct the strategies of action (Swidler, 1986), and culture also can enhance other attributes of ecosystem (Spigel, 2015). In the ZGC case, we find that culture supports and normalizes the entrepreneurial activities, and ensures the fair distribution of rewards.

The supporting and normalization of the entrepreneurial activities are the great motivational factors for entrepreneurs to join in because this culture supports risk taking and provides entrepreneurs and other agents with social prestige, which enhances their legitimacy in the society. One entrepreneur who is a stranger to Beijing ZGC, said, "in my hometown, people consider entrepreneurship as a bad job. But the situation is totally different in ZGC, because it is the hometown of entrepreneurship."

Culture also ensures the fair distribution of rewards through establishing social norms (Shah, 2006). Social norms both encourage value co-creation and protect members from cheating or free-riding. As we discussed in the value co-creation part, there is a risk of cheating and free-riding, in which the mechanism of the commercial market may not be helpful. Under this situation, social norms provide a way to constrain the occurrence of cheating and free-riding (Puranam *et al.*, 2014). In ZGC

case, people consider themselves as generations of internet, in which sharing is pride and cheating or free-riding is seriously dishonorable. This social norm protects them and also encourages people share their ideas and achieve value co-creation and digital innovations.

Therefore, reward distribution is achieved through *entrepreneurial culture*.

Information flow

Information flow is accomplished through (1) physical collocation plus virtual tools supporting and (2) intensive conferences.

Information flow is common in the physical collocation and grouping, and it is also the basic way of coordination (Puranam *et al.*, 2014). In ZGC case, physical collocation and grouping are accomplished through geographical proximity, resource similarity, and live activities. Members of ZGC were all located in the same street. This geographical proximity allowed them to exchange information and collocation conveniently. For example, the company A provides promotion services, and its neighbor, company B provides accelerating services. To provide more complete service, they established a deep coordination.

Virtual support infrastructure and tools include group chatting software, website platforms, applications of mobile phone, and so on. With the rapid development of the mobile network in China, it is very convenient to communicate through a smart phone. In the ZGC case, an Instant Messaging application named WeChat was widely used. It supported group chatting so that the information could flow broadly and quickly. Some service providers established website platforms to connect entrepreneurs, service providers, and investors. For example, one service provider in ZGC established a website platform, on which entrepreneurs can upload their business plans. The officers of this website then will give expert feedback about the business plan and also introduce some investors to entrepreneurs. The virtual support infrastructure and tools facilitate the flow of information, and also enable coordination to occur without the limitation of geography.

Therefore, information flow is achieved through *physical collocation plus virtual tools supporting*.

Besides the common physical collocation and virtual tool supporting, the incentive activities or conferences play a significant role in information flow. Conference provides venues for interaction of actors, exchanging of information and contestation of different opinions (Garud, 2008). In the ZGC case, for variable participants within DEE and existence of the heterogeneous field, intensive conferences connect each other and ensure the efforts from different participants can be integrated.

According to the official website of ZGC DEE, established in June 2014, more than 2,000 conferences are held in the ZGC. In the weekly notice board of ZGC, about four big conferences and several small collective activities are held in average, such as workshops, seminars, and road shows. The intensive conferences bring a wide information flow that enable the deep coordination. For example, in an elder-caring technology seminar, much of the frontier information in this field was uncovered, and the participants could know how they supported the development of this field.

Therefore, information flow is achieved through *intensive conferences*.

Discussion

This chapter is a response to the call of researches on digital entrepreneurship (Shen *et al.*, 2015) and entrepreneurship ecosystem (Autio *et al.*, 2015). Using case study approaches, this chapter found a bundle of solutions to organize DEEs through the case of ZGC (findings are summarized in Figure 1).

The solutions of these four organizing problems (task division, task allocation, reward distribution, and information flow) cannot be separated (Puranam *et al.*, 2014). When the solution of one problem is decided, it could influence others and others' solutions must fit it. For example, self-selection — a common solution to task allocation in new forms — needs a low-centralized task division and tasks should be visible so that members can select them by themselves. Moreover, the reward distribution and information must fit the pattern of self-selection. Each part of the problem has many different solutions, but not every solution suits each other. In this sense, when designing a DEE, it is critical to understand what kinds of solutions are suitable. Our findings provide one kind of bundles of

Figure 1. DEE as a New Form of Organizing

solutions in the context of ZGC. It is not a general solution, but it provides some implications and guidance to designing and constructing DEE.

The theoretical framework of forms of organizing provides a structure to analyze the DEE as the four problems are operational for analyzing. Our findings correspond to the four problems which are divided from the two universal problems of organizing (the division of labor and the integration of effort). However, these findings do not achieve the two universal problems directly. Hence we need to integrate these findings to correspond the problems of the division of labor and the integration of effort. After discussing, we find that the dynamic balance of centralization is important for the division of labor, and the supportive elements are critical to the integration of effort.

The division of labor

For ecosystem, low centralization is the key feature because of its openness and self-organizing nature. However, centralization is not excluded from the ecosystem (Gulati *et al.*, 2012). Somewhat centralization is necessary for establishing the ecosystem. At the early stage of ZGC, task division is designed and task allocation is assigned, which is a high-centralized process. These high-centralized movements enhance the control of agents in the ecosystem. Through the category design, irrelevant members are excluded. The assignment ensures the task was allocated to the agent with basic

capabilities, in which members without enough capabilities are excluded. Meanwhile, the centralization ensures this ecosystem moves forward to its goal, instead of random walking. The categories are designed based on the system-level goal, which constrains the varieties of works that ZGC provides. The assignment ensures the members have ability to manage the categories well and support to achieve the system-level goal.

However, the ecosystem is too complex to be designed well, and with numerous resources, the process of assignment can be very costly. Thus, contributions from bottom up complement the weakness of high-centralized processes and complete the division of labor (Puranam *et al.*, 2014; Thomas and Autio, 2012) such as subtasks division through co-specialization and task allocation through self-selection.

In the next stage of ZGC, low centralization dominates the division of labor, as the beginning is to control members to achieve the system-level goals and exclude irrelevant members. While members are on the road to move forward to the system-level goal, complementariness of the task division and efficiency of the task allocation become the main request. Therefore, low centralization dominates at this stage. But that does not mean the disappearance of centralization at the second stage. When the ecosystem goes wrong, for example, the reward distribution becomes unfair, the architect can fix it through the high-centralized process like draining value jobs to destroy the members who own the rewards unfairly (Spigel, 2015).

Therefore, the division of labor in the ZGC case is a dynamic balance of centralization: in the early stage, the high-centralized process domains for the controlling and in the next stage, the low-centralized process domains for the complementariness of division of labor.

The integration of effort

As for the integration of effort, the connection among agents within DEE is important. The common methods they achieve are found in the ZGC case such as value co-creation and physical and virtual collocation (Gulati *et al.*, 2012; Puranam *et al.*, 2014). These methods achieve the connections that are visible, while some small or hidden connections are invisible and are hard to capture. These connections are like the routine details or hidden rules in the organization which are based on the formal authority and

hierarchy. In DEEs, they are more detailed and complex. We argue that supportive elements such as supportive culture and intensive conference enhance these connections and therefore achieve the integration of effort.

Culture influences the actions of people (Swidler, 1986) and is also necessary for the DEE (Spigel, 2015). The effect of entrepreneurial culture shapes the actions of people within DEE, and these people sharing the same culture are connected together to enforce the integration of effort. Agents in the DEE may not share the system-level goal, but they share the same culture, which is critical to shape the connection among these agents. Meanwhile, intensive conferences link the numerous individuals and activities that are hard to capture and have positive effects on the emergence of innovations in certain fields (Garud, 2008). Value co-creation and physical plus virtual collocation construct the main connection among agents, while supportive culture and intensive conferences achieve the detailed connection so that the integration of effort is accomplished. Therefore, the supportive elements of culture and conferences are necessary for the integration of effort.

Contribution and implication

This chapter has several theoretical contributions. First, our study contributes to the digital innovation study by extending the scope of digital innovation to the ecosystem level. Most researches on digital innovation focus on individual, organizational, and industrial levels (Bharadwaj *et al.*, 2013; Sambamurthy *et al.*, 2003; Yoo *et al.*, 2010), little is known about the ecosystem for digital innovations. Even some researches focus on digital innovation at the ecosystem level, their analysis units are still individuals or organizations under the ecosystem context, instead of the entire ecosystems (Shen *et al.*, 2015). Therefore, our chapter responds to this research gap by considering the DEE as a new form of organizing, which provides us with an operational analysis framework and also enables us to understand DEE as a whole.

Second, our chapter complements the design study of organization by revealing the new form of organizing of DEE. In organizational design study, the collaboration among legally autonomous actors challenges the traditional thinking about organizational design because these actors

collaborate effectively without traditional organizing elements such as formal authority and incentives (Gulati *et al.*, 2012). In order to overcome the challenge, this kind of collaboration is considered as a new form of organizing (Gulati *et al.*, 2012; Puranam *et al.*, 2014), which is adopted in our chapter as the theoretical framework. One worthy research question, which is answered by our findings, is exploring how the designers of new form of organizing specify a division of labor (Gulati *et al.*, 2012, p. 580).

Third, our chapter also contributes to the entrepreneurship literature for unveiling the organizing process of an entrepreneurial ecosystem. DEE is not only an ecosystem generating digital innovations, but also an ecosystem support entrepreneurship based on digital innovations. Because limited researches focus on entrepreneurial ecosystem, *Strategic Entrepreneurship Journal* (SEJ, a top journal in entrepreneurship field) called for a paper on entrepreneurial ecosystem (Autio *et al.*, 2015). Thus, our chapter also responds to this research call by analyzing the DEE.

Our findings also have practical implications. As the establishment of DEEs is hot in practice, this chapter may give some implications to the architects and policy makers. The theoretical framework of forms of organizing (task division, task allocation, reward distribution, and information flow) also provides a powerful instrument to both researchers and practitioners to better understand the forms of DEE's organizing. As to members in DEE, our findings enable them to know better about DEE and to have a better involvement in DEE. This is helpful to reduce the failures of entrepreneurship.

Limitation and future research

This chapter has some limitations. First, although we try to make our findings as inclusive as possible, we must acknowledge that it is hard to completely identify all the possible activities which compose the new forms of organizing within DEE. For the huge amount of agents and activities existing within DEE, it is hard to identify each of them. Thus, we try to capture the core activities that are mainly effective for the organizing process. Moreover, our single-case study of ZGC also cause this limitation considering that different DEEs have different contexts. Therefore, future researches can focus on multiple cases of DEE under

different contexts, or applying the framework of forms of organizing to analyze other DEEs.

Second, the environment of ZGC as a DEE is relatively special because China's government and state-owned enterprises play an important role in design and development of ZGC. However, in other regions, such as Silicon Valley and India, the involvement of government in DEE's creation and expansion is much less than China's condition (Saxenian, 2004). This difference may influence the practice of organizing forms of DEE, and some new organizing forms may be identified under different contexts. Because the best practice of DEE does not exist until now, different designers have their own methods of exploring the forms of organizing. Thus, future researches can focus on DEEs in other regions which are quite different from China, or focus on the comparison of DEEs under different environments.

Conclusion

Collective collaboration gives positive effect on digital innovations for the combination of heterogeneous resources. This highlights the importance of DEE for digital innovations because DEE contains variable resources and provides a platform for boundary-spanning practices. However, the understanding of DEE is still limited (Spigel, 2015). From our observations, we argue that DEE is not only a combination of resources (Spigel, 2015), but also a new form of organizing (Gulati *et al.*, 2012; Puranam *et al.*, 2014). In order to achieve the system-level goal, DEE has to organize resources efficiently and effectively.

Through this case study, we found eight activities which compose the organizing form of DEE. These activities give us some insights that balance of centralization is important to control and complement the division of labor; the supportive elements such as culture and conference are necessary for the integration of efforts. Our findings and insights deepen the understanding of DEE and give some implications for the practice of DEE.

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Appendix A

Table A.1: List of Interviewees

Categories (Number of Interviewees)	Examples
Entrepreneurs (N = 16)	<ul style="list-style-type: none">• Founder of an entrepreneurial company of Internet education, former employee of Midea (a large white appliance company in China)• College students who are preparing to set up their own company• Mr. Chen, founder of an entrepreneurial company in Internet medical care, owning a successfully IT company which is still running
Government/ State-owned Enterprise (N = 8)	<ul style="list-style-type: none">• Senior Services Informatics Development Committee (SSIDC), a facility of China Association of Social Welfare. It is founded to improve the innovation and development of information senior care• Haizhi Kechuang (HZKC), an institutional skate holding company that designed the ZGC innovation street and maintain it functional• ZAC, a government agent that guides the development and construction of ZGC
Accelerator Centers (N = 10)	<ul style="list-style-type: none">• Asia America Multi-Technology Association (AAMA), an association focusing on accelerating technical start-ups. AAMA established its angel fund in 2012 and set up an accelerator and coffee shop in 2014 in ZGC• Legend Star, providing entrepreneurial services such as mentor guiding, accelerating, and angel investment• 3W coffee shop, a company that services internet entrepreneurship and it has its own coffee shop, accelerator, training program, and angel fund
Third-party Service Provider (N = 7)	<ul style="list-style-type: none">• Angel Service, a web platform connecting entrepreneurs and investors. It also provides training service to help entrepreneurs perform better in the meeting of investors• Law Service, a company providing law services for start-ups, such as company register, contract drafting, patent appliance, and so on• E-Capital, providing financial advice services for companies
Investors (N = 10)	<ul style="list-style-type: none">• YCT, a venture capital investment company that focuses on catering, cultural and technical industry• Mr. Guo, an angel investor after successfully setting up XN Media• Zhejiang PD Investment Company, a company located in Zhejiang Province
Total Number of Interviewees N = 51	

Appendix B

Table B.1: Archival Data

Category	Examples
Government/ Official information	<ul style="list-style-type: none"> • Official Website of ZGC Innovation Way. “Introduction.” http://www.z-.com/index.php?app=web&m=Article&a=detail&id=16. • Official Website of Beijing Government (12 October 2015). “Advanced Innovation Way” ‘Expending 7.2 kilometers’, Retrieved 15 January 2016. http://www.beijing.gov.cn/tzbj/tzxx/kfqdt/t1405612.htm. • Ministry of Science and Technology of the People’s Republic of China (2014, 18 June). “The opening of ZGC Innovation Way”, Retrieved 15 January 2016. http://www.most.gov.cn/kjbgz/201406/t20140617_113821.htm.
News/ Reporting	<ul style="list-style-type: none"> • <i>China Daily</i> (13 June 2014). “Beijing Zhongguancun opens innovation street”, Retrieved 15 January 2016. http://www.chinadaily.com.cn/beijing/2014-06/13/content_17584416.htm. • Xinhua Net (20 March 2015). “Beijing’s Zhongguancun Innovation Street Services for Startups”, Retrieved 15 January 2016. http://news.xinhuanet.com/english/photo/2015-03/20/c_134082125.htm. • People.cn (7 May 2015). “Premier of China Mr. Li is present in ZGC Innovation Way: Something Details You Don’t Know”, Retrieved 15 January 2016. http://politics.people.com.cn/n/2015/0507/c1024-26965741.html.
Videos	<ul style="list-style-type: none"> • CCTV.com (24 May 2015). “Dialogue: the sequel of ZGC Innovation Way”, Retrieved 15 January 2016. http://jingji.cntv.cn/2015/05/24/VIDE1432481428440900.shtml. • Guangming TV (19 October 2015). “The disappearance of ZGC! Upgrading from Electronic Market to Innovation and Entrepreneurship Street”, Retrieved 15 January 2016. http://v.gmw.cn/2015-10/19/content_17376721.htm. • CCTV.com (7 May 2015). “Premier of China Mr. Li is present in Chinese Academy of Sciences and ZGC Innovation Way”, Retrieved 15 January 2016. http://news.cntv.cn/2015/05/07/VIDE1430997481826462.shtml.