

BUSINESS ACCELERATOR NETWORK: A POWERFUL GENERATOR OF STRATEGIC EMERGING INDUSTRIES

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©Ontario International Development Agency ISSN: 1923-6654 (print)

ISSN 1923-6662 (online). Available at <http://www.ssrn.com/link/OIDA-Intl-Journal-Sustainable-Dev.html>

Abstract: Technological innovation becomes increasingly important in the age of new economy. Therefore, service system for innovation has been in continually organizational change in order to improve innovation efficiency. For example, Technology Park, industrial laboratory, business incubator and business accelerator, are all serve for technological innovation. It could be foreseen that new organizational model for innovation service will emerge. In recent decades, the system shows the characteristics of professional, modularity and integration by network. This paper noted the newly founded organization in Southeast Michigan which is called Business Accelerator Network, and think it is an effective and productive organization for providing innovation resources. Development of Technology and economics makes business accelerator upgraded, while fostering emerging industries of strategic importance requires great support from business accelerator network (BAN). BAN, which integrates modularized professional service and participates in horizontal industrial division, is an important producer service that boosts emerging industries and perfects innovation environment. Centralized model, distributed model and mixed model are typical governance structure of BAN. Different model encounters different stage of innovation service market. In detail, Centralized model fits for the early market stage; mixed model fits for the developing market stage; and distributed model fits for mature market. The three models provide a practical path, for developing countries or

region facing economic transition and technological change, to foster BAN.

Keywords: Business Accelerator Network; Organization of innovation service; modularity; networked; governance structure

INTRODUCTION

Technology-based small and middle sized enterprises (SMEs) are important for sustainable economic development, which play a significant role in providing jobs and regional economic growth. As technological innovation and economic performance are closely connected, policy makers are trying to accelerate pace of innovation. Therefore, competitions around innovation are continually fired, and organization of innovation service increasingly evolved and updated. When concerning about the shortage of innovation resources, regions seem not to accumulate advantages in a new era of innovation competition and strategic emerging industries simply by adding input. Innovation service plays an import role in technological innovation competition. It follows that creating innovation resources leverage through organizational innovation and system promotion in innovation service, would be a significant resolution to improve technological innovation. Innovation service combines with traditional industry, facilitates reconstruction of produce system, and becomes a remarkable feature of modern knowledge economy. Recognition of organizational promotion in

technological innovation service needs further attention, as knowledge economy hangs on an effective regional innovation systems in which knowledge and information are produced and transferred efficiently. Recently, a new type of innovation service organization, called as business accelerator network (BAN), is emerged in Michigan State, after business incubator and business accelerator.

There is not yet universal agreement about the concepts of BAN, this paper defines it as: a portfolio technological and economic services that consist of some professional business accelerators whose functions synergized, and affiliated service organizations. Institutions play a more important role than technology in developing high-tech industries. Technological catch-up relies on the integrated ability for innovation resources and integrated efficiency of regional innovation system, most of the economic and technological advantages profit from innovation of managerial organizations and managerial behaviors and the transformation of social structure and institutions (Freeman, 1987). BAN is a creative organizational innovation which reconstructs agglomerate model of technological innovation resources and could be a favor to accelerate technological innovation and promote development of strategic emerging industries. Therefore, exploring and analyzing BAN would be a useful work. This paper discusses the evolvement of technological innovation service system, addresses the development trend that business accelerator will walk up to BAN, gives three-dimensional analysis of BAN, and puts forward three typical governance structure which provide path way to foster BAN for a developing country or a region facing to make economic transition.

EVOLVEMENT OF TECHNOLOGICAL INNOVATION SERVICE SYSTEM

Divisions are subject to market scale. The dramatically enlarged technological innovation market and its increasingly important role in economy and society, give birth to a new kind of divisions that is called service for innovation. This industry develops according to the rule of reducing costs and improving efficiency, and employs new form of organization that suits for different ages, such as Technology Park, capital investor, business incubator and business accelerator, and so like. There are three remarkable features in the evolvement of technological innovation service system.

Specializations of organization of service for innovation

Technological innovation is an activity of high difficulty, high costs and high risk, so it was

conducted by government or giant enterprises in the early stage. For instance, government of United States organized the grand science and technology strategy in World War II; and the great manufacturer like Ford Corporation, carried out technological innovation. Along with the increasingly intensified competition, in order to decrease investment, reduce risk and accelerate innovation pace, technological innovation begins to move towards external resources rather than that of internal. It is considered that "firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology (Chesbrough, H.W., 2003)". Large enterprises set up R&D department one after another, use external innovation resources, and cooperate with universities, research institutes and other enterprises. Consequently, business technology alliance, strategic alliance, and the like emerged.

Special organizations of service for innovation derived from technological innovation industry. According to Henry Etzkowitz (1997), the founder of triple helix theory, university business incubator is one part of the series intricate organizational change that supports technological innovation, these organizations include industrial research laboratory emerged in the late 19th century, technology transfer institution in the early 20th century and venture capital firms after World War II. Technology park is a profound organization of innovation service. Since the generation of Stanford Research Park (the first one in the human history), technology park has prevailed all over the world. Stanford Research Park made Silicon Valley "a habitat for innovation and entrepreneurship"; technology park has been copied globally and testified to be a successful organization of innovation service.

Technology park is a synthesized organization of innovation service. The fiercely competitive high-tech industries require more efficient organization to provide increasing innovation service both in quality and quantity. Technology business incubator, business accelerator, and the like professional organization emerged whereafter, which further deepen the technological innovation industry. In the process, venture capital company, consulting company for technological innovation, law firm, accountant company, and the forth organizations evolved synchronously. Specialization and divisions interacted, and continually deepened. Take business incubator as an example, "during the 1970's and 1980's, most business incubators were of the mixed-use types.....did not focus on industry or product," and "beginning in the 1990's, a change to this began with the emergence of pure business incubators, being those that focused in one area known as

technology clusters" (Willing, 2000) . This feature is even more evident in the development history of business accelerator which focuses on specific technological fields and devotes to fostering business cluster at its initial age.

Innovation of organizations Speed up

Organizational change is the permanent subject of economy development, especially in technological innovation. Tidd, Bessant and Pavitt (2005) take technological, market and organizational change as an integrated issue to realize innovation. "Every era in the history of business has witnessed the emergence of new organizational models that have powered the creation of value and wealth (Hansen, Chesbrough, Nohria, et al. 2000)." This point also has been deeply investigated by Chandler (1969), who researched business history and argued every great productivity growth is accompanying with significant change of organizational structure since 1840. Market scale influence technological innovation, large market is inclined to motivate people to innovate as innovation revenue will be greater than that of small market. Tremendous technological innovation market continually catalyzes various creative actions including technological innovation and organizational change. Organization of innovation service is making change with the purpose of improving utility of innovation resources and accelerating pace of innovation. It is known from research report released by OECD that every 3-5 year, new organizational conception will be born; and in developed countries, every 5-10 year, organizational innovation will be achieved.

Since the last decade of 20 century, business accelerator, innovation-works and innovation relay centre has emerged one after another, and creating innovation edge. Practically, technology park aggregates key elements of technological innovation such as high-tech enterprises, R&D institutes and service providers, realizes clustering effect and synergy, innovation performance therefore is promoted. However, technological innovation edge cannot be attained simply by elements aggregation in an intricate innovation eco-system. Thus, creating effective organization and making the best use of innovation resources become the big issue. Business accelerator facilitates gazelle's growth and makes industrialization of new tech a faster process. Innovation-works (somewhat alike the Idealab) is a vigorous organization affiliated to large enterprise, focusing on development of new tech and new products, which could make best use of professional human resources (mainly the technical experts). Facing the blowout of technological innovation information, Europe establish Innovation Relay Centre (IRC) to reduce costs of information searching

and selecting; meanwhile, it find out enterprise's technical needs, and make new-tech providers participate in technological innovation circle with lower costs.

Modularity of function and integration through network

Technological innovation is a dynamic system including various participators, which have to obtain balance between complexity and stability. In a system, there is a reciprocal relationship between complexity and stability. Modularity is helpful to reduce system's complexity without cutting contents and repressing system vigor while network is useful to enhance system's stability with keeping inclusiveness and openness. The former is like mechanical device. Modularity of function will decrease complexity of system and can easily make innovation within specific module so that system could be promoted. And the later is like ecological system. Interlaced food chain is opening and inclusive (that means existing one could be altered and new one could join in.), and the more complex the network is the more stable the ecological system is. In Recent decades, technological innovation and its organization of service providers represent the characteristics of modularity and network, and this trend is being intensified.

A growing number of industries start to extend modularity from produce stage to design stage (Baldwin and Clark, 1997). Recently, modularity is a significant trend in technological transition and industrial organization change. Modularity of products and industrial organization bring regional economy enormous competitive edge. According to Aoki M. (2002), module is a semi-autonomy sub-system, making a more complex system with other similar sub-system under designed rules. Modularity includes two opposed action, module decentralized and module centralized. The former represents the action of decentralizing a complex system under designed rules into semi-autonomy sub-system that enjoy the freedom to design, and the latter is exactly the reverse. He stated further that modularity is an original effort to handle with complex issue. Baldwin and Clark noted that the essence of modularity is that different module can be carried out independently and respectively, and could integrate the modules through various methods. Modern technological innovation and its related service concern various social and economic fields; it's hard for one to embrace every action. And then modularity is the inevitable option of innovation service which could be decentralized as R&D, financing, experimental producing and scale producing, marketing, and legal and accountant service.

Based on information theory, network society

emerged gradually as a new form of human being's social organization at the end of 20 century. The trend of network impacts on technological innovation industries, and catalyze the generation of networked organization in innovation service. As early as last century's nineties, Britain established Business Link with the purpose of facilitating technological transfer and development of SMEs, through which enterprises could acquire technological information, management consulting and other beneficial services (Bryson and Daniels, 1998). Later, innovation initiated and covers the whole European regions, and become an important measure bridging industry and research institutes like university and R&D center, which improves technological transfer effectively. Similarly, governments attempt to supply networked service to SMEs and technological innovation. Denmark and Australian government carried out a series technology policies and business network programs, and aimed to construct SMEs development network (Huggins, 1996; Fulop, 2000). What's more, Canadian government provided more systematic and integrated SMEs service network (Zinger et al., 1996). Kolodny et al. (2001) notes Business Link realized important changes: (a) "a shift of focus to a service gateway rather than the traditional view of service provider", (b) which "was a decentralized emphasis on regional technology centers and councilors", (c) "a move towards integration rather than specialization and an information rather than a transaction orientation". In sum, networked organizations which provide integrated service become the significant orientation of innovation service industry. The currently emerged BAN of Southeast Michigan testified this tendency.

FROM BUSINESS ACCELERATOR TO BAN

"Innovative start-ups need more than just money. Networking and coaching were identified as additional needs (Clarysse and Bruneel, 2007)." "Regional developers are criticized for their inadequate ability to integrate themselves into the regional networks and innovation processes of firms and their ability to determine firms' needs for innovation and networking (Mukkala, 2010)." Governments pay much attention to policies supporting SMEs, but not enough on constructing professional networking support. The innovation service organizations which have development potentiality and competitive advantage, should provide networked service and gave full play to the role of the leverage effect of innovation resources; should combine the best innovation elements through modularity and integration, and use and share them flexibly.

Technological and Economic Root of Expediting the Update of Business Accelerator

Business Accelerator is an organization that provides relatively short-term support to SMEs, "services may include anything that assists the business to optimize its growth, either through strengthening its infrastructure, redefining its product and services to answer the needs of its target market, or preparing it for exits and mergers (Price, 2004)". It is an intensified physical space with professional service team, cooperating with various participators with which it establish business network, and providing services to SMEs through multiple models. Compare to business incubator, business accelerator's functions and services are enlarged and enriched, especially in satisfying gazelle's growing needs. However, business accelerator have shortages, such as weak networking ability, lack of innovation service, narrow service scope, and is inadequate to satisfy the requirement of speed development of strategic emerging industries.

In geography, business accelerator is located on specific region and provides service according to its own resources. Thus, the region service that could be supplied is not very large, and service ability is limited. In post industry, industrial divisions shift from flat divisions to vertical divisions. Technological innovation break away from regional restricts and look for superior resources in a much larger geographical region. For example, Silicon Valley is the global benchmark of technological innovation, and local enterprises adopt resources around the world; software come from India; and north Ireland and primary products are made in China and Southeast Asia. Technological innovation based on a small geographical region has little edges in a global competition market, so innovation service has to break through geographical restrictions accordingly.

Observed from the perspective of industry, business accelerator always focuses on enterprises concerned with a specific technological field, as it is limited by organizational costs and operational costs. The service scope is narrow and service contents are scant, and it is hard to satisfy economy diversification. In USA, the home of business accelerator, majority is professional that concentrate on a small industry. For instance, Automation-ally aims to serve automatic enterprises, and Macomb-OU focuses on defense technological firms. Professional business accelerators sacrifices service scope and reduce the matching rate between demands and supply while improve service efficiency.

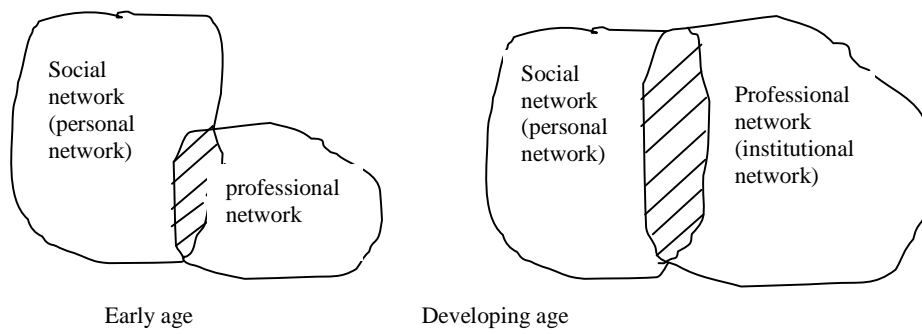


Figure 1: The transfer of enterprises from social network to professional network

See Birle and Cromie (1988). *Social Networks and Entrepreneurship in Northern Ireland*, Enterprise in Action Conference, Belfast.

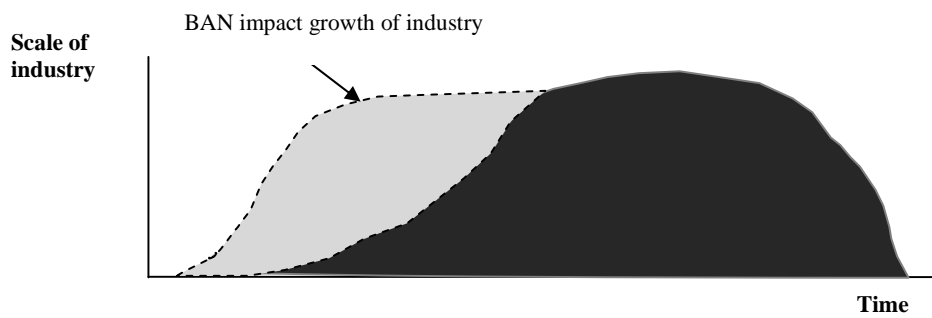


Figure 2: BAN accelerate growth of industry

There exist gap between business accelerator's weak network function and highly increased networking requirement of high-tech enterprises. Network is critical to SMEs, which has been thoroughly researched by many scholars (Birley, 1985; Johannisson, 1988; Jarillo, 1989; LARSON, 1991; ZHAO and ARAM, 1995). Moreover, network plays a significant role in technological transfer and promotes technological innovation performance (Freeman, 1991; Üztel H. and Martin S., 1998; Hansen, 1999; Hanna and Walsh, 2002; Albors et al., 2005). Business accelerator only aggregates and makes use of limited innovation resources, and cannot realize the leverage effect. What's more, development of enterprise shall make transfer from entrepreneur's network to professional network (see Fig. 1), in other words, from personal transaction to impersonal transaction, in order to get rid of passive side-effect of personal network. Business accelerator cannot fully fulfill the requirements of the network support for such transfer.

Strategic emerging industry and BAN

Strategic emerging industries based on fundamental technological innovation, will arise innovative blowout and speed development of emerging industries. Developing strategic emerging industries is the primary requirement to take part in the new round of international industrial divisions, and is the precondition to boost up economic development. It's a critical issue that attracts both developed and developing countries in 21st century. Development of strategic emerging industries requires high-level innovation services (including scale, speed and function intensity). Traditional organization of innovation service will be unable to satisfy such tremendous demand. BAN embodies the advantage of scale, scope and networking, and could be effective hothouse to foster emerging industries.

Usually, innovation resources are separated. It is hard for SMEs to obtain all the elements within a specific local place. Thus, providing innovation resources through network is beneficial to the improvement of innovation performance. HANSEN et al. (2000) argued that networked incubators have "mechanisms in place that foster networking," with the help of its institutionalized networking start-ups can establish their business network before competitors and gain developing resources and partners. Hansen further indicated networked incubator is the "hothouses of the new economy". Similarly, Jang and Rhee (2006) researched in Korean incubators, and argued better networked incubators which can provide incubatees with effective internal networking and sufficient external networking as well perform better. BAN takes professional business accelerator as main nodes, set up institutional network connections, and

then facilitates innovation resources, such as knowledge, talents and technique, circulate from here to there, and help enterprises establish their business collaborative networks. The networks BAN have itself and these collaborative networks combined, which provides SMEs institutional networking, and then makes business network an important change "from status to contract", precisely as Maine's famous assertion, "the movement of the progressive societies has hitherto been a movement from status to contract".

BAN is inclined to create innovation resources leverage effect, realize economy of scale and scope, lower transaction costs. At a specific time period, innovation resources are limited and belong to scarce elements. It follows that to win in technological innovation is not a competition of adding inputs, but rather than a creative action to make best use of limited resources. Developing strategic emerging industries therefore shall optimize resources flow, make innovate in organizing model of supply, and magnify leverage effect of innovation resources. On the one hand, BAN is helpful to increase match rate between demander (SMEs) and supplier (service providers) through network, then realize economies of scope; on the other hand, it reduces the per-unit costs of innovation service by scaled supply, then obtain economies of scale. What's more, participators within network share knowledge and information, which could reduce the costs of frequent transaction of specific assets with uncertainty. Technological innovation is highly uncertain, Powell et al. (1996) indicates that's why network generated in high-tech industries. In other words, network enables to decrease transaction costs of technological innovation participators.

Strategic emerging industries shall realize economy of speed (according to CHANDLER it means high throughput and utilization), which has a high level requirement in supply of innovation service and resources enterprises need. Economies of speed refer to the utilization of an asset to produce outputs at a higher rate of throughput and through a decrease in the time required to produce outputs, the unit cost declines. Strategic emerging industries have to create advantages in patents and marketing, realize economies of scale through economies of speed, and then construct excellent industry base and achieve competitive edge of regional economy. Within a short period after fundamental technological invention in industry, large quantities innovation service and resources SMEs required shall be provided so as to facilitate technological transfer and improve growth of SMEs. Obviously, single business accelerator is unable to fulfill the explosive growth. Lacking of effective organization to supply innovation resources will lose the opportunity to seize industrial edge and

fall into the tail end of the new round of international industry chain. BAN will most probably fulfill such demand, foster the whole technological enterprises cluster and accelerate industry development (see Fig. 2).

Both nature and human history illustrate that tiny distinction at the initial age will lead to great difference later. The small edge in fostering strategic emerging industry at the beginning, will help to win industrial competition for regional economy. BAN, through which we develop strategic emerging industry and made a place highlight innovation, will be great significant for economy transfer and improving international economic competitiveness.

THREE-DIMENSIONAL ANALYSIS OF BAN

BAN integrates modularized innovation service, promotes development of high-tech industries, and improves regional economic competitiveness. Therefore, BAN concerns with professional innovation service, industry update and regional development, and upgrade with the spontaneous evolvement of the three. Isolated observation on technological innovation is inappropriate, and a dynamic systematic investigation on technology, industry and region that are mutually interdependent and complementary would be better. Hereafter, an exploration on BAN from three relative dimensions is conducted.

Professional service module and system integration

From the perspective of professional service, BAN is an integration of innovation service based on specialization and modularity of service. Technological innovation needs a series of services including R&D, technological transfer, venture capital, talents, information, and so on. Specialization brings efficiency, under which innovation service is evolved. However, specialization also gives birth to two passive effects. The first one is specialization gap. For example, the gap caused by discipline separation becomes a remarkable reason that blocks technological promotion, and academia encourages inter-disciplines and multi-disciplines research attempting to release such gap. This effort contains the thought of integration. The second one is system diversity which leads to system instability and requires generic rule to coordinate. For instance, computer hardware are highly specialized which results in multiple development, and generic rules realize the balance between diversity and stability. The generic rule has the function of integration. Specialty and diversity of innovation service increase SMEs hunting costs and development risk while

enrich service contents and improve service performance. Hence, service units and organizational model shall be reinvented in order to provide integrated and effective innovation service.

Baldwin and Clark noted that modularity can easily handle with complex system. System integration is based on modular by which risk and costs can be lowered. Advantage of modularity is that each module can work independently in the meantime, boost the rate of innovation, make combination and connection easier, cut down design time and shorten production cycle.) Meanwhile, modularity induces and deepens specialization. Professional service providers derived from specializations in innovation service, and pursue innovation and excellence within their module. Price (2004) indicates in his research on networked regional business accelerator in Utah, that professional service providers play an important role in establishing regional business accelerator. Under the modularity theories, professional innovation service could be integrated at a lower costs and difficulty, and provide to SMEs through network. Specialization, modularity and integration constitute helix-type movement, and make continually creation in innovation service.

Horizontal industrial divisions and industry incubating platform

From the perspective of industrial development, BAN is an organizational model undertaking horizontal industrial divisions, whose key function is supporting emerging industries with large quantities of services. In other words, BAN is the industry incubating platform devoted to developing strategic emerging industry. The horizontal industrial divisions system constitutes R&D, design, purchasing, manufacture, marketing, and relative support actions; it is facing a shift from internal transaction within enterprise to external transaction among enterprises. It is the evolvement of horizontal industrial divisions that breed professional innovation service. Generally, horizontal industrial divisions include three functional modules. They are R&D, manufacturing and marketing. Knowledge in horizontal divisions appears uneven distribution. R&D and marketing rely on advanced productive elements such as knowledge capital and technology, and are profit source and key competition in industry, and the main service fields that BAN concentrates on. This is conforming to the Smile Curve (see Fig. 3). BAN provides scaled and diversified support service to SMEs, and it is a new organizational model with competitive force in the age of new economy, which will be helpful to improve regional economy's status in horizontal industrial divisions.

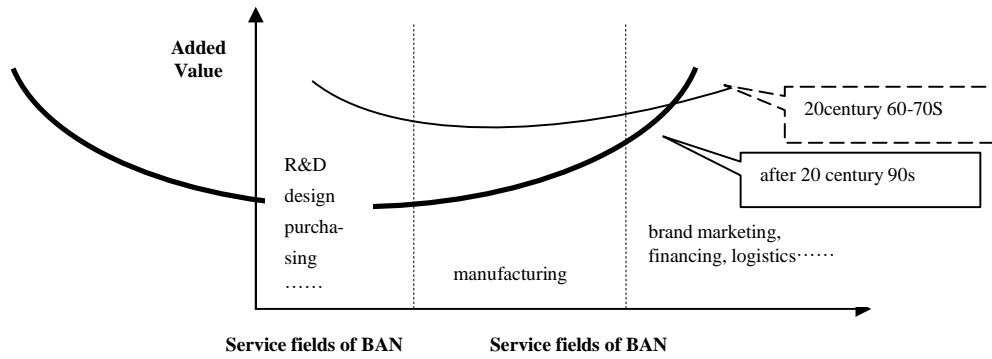


Figure 3: Horizontal industrial divisions, smile curve and Service fields of BAN

Table 1: Comparison of Three Governance Structure of BAN

	Participat ors	Organizat ion-al connectio n	Contro l force	Organizat ion-al costs	Integra te efficien cy	Market type	Type of module centralizing
Centrali zed model	Stable	Very close	Powerful	High	High	Early stage	Information pyramid divided
Mixed model	Sometimes altered	General	Middle	Middle	Middle	Developin g stage	Information assimilated
Distribu ted model	Freely changing	Loose	Weak	Low	High	Mature market	Information catabolized/ev olved

BAN is an organizational innovation and an important part of production system innovation. Organizational innovation has a significant impact on economic performance. For example, twice production system innovation in auto industry, fordism and lean production (Toyota production system), left brilliant results in industrial history. Scale and scope are the dynamics of industrial capitalism (Chandler, 1987). Though the application of economies of scale and scope are somewhat changed in knowledge economy, they are the basic rules that have important impact. In the process of developing emerging industries, BAN provides SMEs scaled (both in quantity and category) innovation service, obtains economies of scale (lower unit costs) and economies of scope (high match rate). Through BAN, economic throughout of emerging industries accelerate accumulation, create economies of speed and then engender self-enforcing mechanism that has increased marginal returns. Consequently, emerging industries realize scale advantage through economies of speed, by which it seizes the developing opportunity and enhance strategic edge.

Produce service and promotion of innovation environment

In regional economic system, BAN belongs to produce service, focuses on technological innovation and emerging industries. Producer service has great impact on regional economic development and creating new jobs (Coffey and Polèse, 1989; Hansen, 1990), and plays an important role in long-term economic development (Lundquist et al., 2008). According to Beyers (1996), "9.3 million of the 30.1 million new jobs created in the United States from 1974 to 1991 were in the producer services industry, the largest growth of any broad industrial sector in the nation." Macpherson (2008) conducted a 12-year tracking study of New York State manufacturers, and noted that a growing number of manufacturers used producer services (such as research and design) far more than those of 12 years ago. Since the new century, produce service and manufacturing combined closely, and became the remarkable feature of production system innovation. BAN realizes integrated supply of producer services, and this trend was noted by Bailly (1995). He pointed out the future research of producer services includes "the integration of producer services into networks" when reviewing the producer services in Europe at the mid 90s of last century. The development of the newly founded BAN in Michigan testifies the leverage effect of produce service in regional economic development.

BAN will be a critical element of regional innovation system, and drives its evolvement into high level. Freeman (1987) emphasized in his narration about

national innovation system, that innovation system is a network consists of public and private agents, through which, the initiation, introduction, improvement and transferring of new technique are realized. BAN links various participators in technological innovation, effectively integrates innovation resources, and becomes an important representation of updated regional innovation system.

GOVERNANCE STRUCTURE OF BAN

Essentially, BAN is a kind of network organization. Of significant importance are, network organization is very resilient to environment change, and can bring all the network nodes into play and realize synergy innovation. Therefore, network organization enables itself to accelerate innovation process while each node has the functions that they can't if not networked. Generally speaking, interaction and integration are basic mechanism for network governance, in order to obtain synergy. Different coordination model makes diversified governance structure. Organization evolutionary logic and market developing characteristics are combined herein, employing ideal-types method created by Marx Weber, to put forward three governance structure models of BAN, attempts to provide referential resolution for developing countries to foster BAN. Coincidentally, these three models are coupling with Japanese scholar AOKI's viewpoint about three basic formation of module centralizing (they are information pyramid divided, information catabolized/evolved and information assimilated), investigated from the perspective of information flow.

The first type is **centralized model**, which produces and updates service modularity under central control. The organization form presents hierarchy structure which is based on modularity, is flat and juxtaposition organization rather than traditional pyramid organization. In centralized model, central controller establishes general rules (visible rule), distributes assignment to participator, and finally integrates modularized service. Service provider acts under general rules, and devotes to produce and make innovation within local module. Centralized model presents the characteristics of stable participators, intensive organizational conjunction, powerful control ability and high integration efficiency, while it has the weakness of expensive organization costs, innovation deficiency, and so like. Investigated from information flow, centralized model is the counterpart of "information pyramid divided".

In an initial market, innovation service system has to be strongly promoted and complete systematic function and stable system environment are absent, centralized model therefore could be employed. BAN's system function can be realized through establishing organization, constituting general rules

and allocating assignment. What's more, it needs to operate under a powerful key controller which will be the role of government or giant enterprises. At the early stage, BAN is committed to providing public service or quasi-public service, focuses on services innovation required, devotes to create a prosperous services market for innovation, and attracts excellent service provider to take part in and enrich service content. In the case of a giant enterprise which plays as the key controller, government shall offer policy support or financial subsidy.

Of significant specialty is, centralized model call for a powerful subject to initiate BAN and control the consequent operation. Besides, Centralized model requires rational allotting mechanism of module assignment and incentive mechanism of module innovation. The former ensures BAN's system function completely and operate orderly; the later motivates participator to process innovation within assigned module and achieve high efficiency.

The centralized model is at the one end of the spectrum while the **distributed model** is at the other end of the spectrum. In distributed model, BAN's organizational structure presents distributed network, and any node connects with at least two other nodes directly and information could be transported through multiple roads. There is no central controller, and BAN will not be paralyzed as headquarter being destroyed. Thus, information transfer in distributed network is more efficient and reliable. Service provider act mutualistically and independently, supply professional and modularity service. Though the suppliers often altered and have casual connections with each other, they enjoy vast innovation space and have vigorous innovation ability. There is no remarkable controller or coordinator within the BAN, mainly operated under market mechanism or industry association. Distributed model is a semi-opening structure which obtains the balance between order and vigor. Based on well-rounded innovation service market, distributed model requires large quantities of service providers and high quality service, and asks for extensive service categories. Distributed model fit for "information catabolized/evolved" which Aoki Masahiko called as "Silicon Valley Model" while Baldwin and Clark described it as "Module Cluster". Practically, the innovation service system in Silicon Valley is close to distributed model, which is a highly mature market with innovative vigor.

Distributed model is tightly joined with modularity, resulting from the coupling of semi-opening structure and semi-autonomy system. Modular maker could participate in BAN's whole systematic function without revealing proprietary technique and service know-how, and deal with the conflict of division and

integration. Modularity is helpful to get rid of intricate innovation service, and provide multiple options to cope with uncertainty of system which consolidates system's stability. In distributed model, innovation service system appears to be modularity cluster, intrinsic competition is very fierce, and innovation process accelerated, which generates regional advantage compared with other places. That's like bee swarm in the nature; Kelly (1995) thought it is typical "distributed governance".

Distributed model satisfies the requirement of distributed innovation, and will be the important developing field in the future. Distributed innovation means that technique and relative ability that innovation needed are distributed among various enterprises and other knowledge providers (Coombs and Metcalfe, 2002), and it requires pre-existing relationships to realize innovation (Coombs et al., 2003). Knowledge has path independent, and local environment will have impact on knowledge producing and transferring, which enhances the knowledge's regional and industrial characteristics. As a result, these traits make distributed network have special advantages. In distributed model, participators' knowledge types and service contents differed, and existing knowledge and complementary knowledge come from different regions and industries could be integrated, employed and reproduced through distributed network.

The **mixed model** will be located at the middle of spectrum. A mixed model BAN needs a key organization to coordinator operation; participators will be its service subcontractor. The key coordinator is responsible for system rules, defining service modules architecture, interface and standards. Participators produce and provide service according to these rules, and have freedom over their modules. In mixed model, key coordinator connected with participators through contract and cooperation. Various parameters, such as organizational connection, control force and integrate efficiency, are at the moderate between central model and distributed model. Key coordinator explores technological innovation needs and market changing, and sends this information to participators. Service providers compete face to face, improve and update module continually. Therefore, replacements of participator become ordinary phenomenon. The mixed model is corresponding to "information assimilated" in which powerful subject, for example, venture capital firm, plays a significant role at information coordination.

The mixed model suits developing stage of innovation service market, and it is an organizational arrangement under searching costs and matching risk. When working toward into developing stage, both

service provider and service categories increased. In order to reduce costs of organization and operation, central model is looking for ways to parcel out the intricate service system. However, service module cannot be obtained easily, and the difficult of searching and matching discomfort also exist. Key coordinator therefore is needed to perform BAN's systematic function. The key coordinator could be government or great enterprise group, but shall gradually apply market mechanism, and government shift from the role of key coordinator.

Central model, distributed model and mixed model are three typical governance structure of BAN (see Table 1). Theoretically, three models correspond to different stage of innovation service market respectively. As a matter of fact, they will be interlaced at one stage as unbalanced development of market which arises from distinguishes of resources and regional environment. The "ideal typology" division of three governance structures provides resolution for developing countries and developed regions which plan to accelerate emerging high tech industries to foster BAN. At the first step, government dominates to establish central model BAN by bringing administrative approach into play. At the second step, after BAN being well-operated, government shift from the player gradually and mainly focus on external intervention, and the leading enterprise start to operate BAN. And at last, working toward a prosperous and rigorous innovation service market (such as Silicon Valley), government have to concentrate on providing public goods, especially institutions and rules.

DISCUSSION

Sustainable economic growth relies on two aspects. On the one hand, it depends on whether technological updating can find newer and larger resources, and break away from the rule of revenue decrease of existing resources; on the other hand, it depends on whether institutional evolvement can hold more efficient technology and motivate various agents' create enthusiasm, and make a more effective society. Efficient economic organization is the key of economic growth (North and Thomas, 1973); and effective innovation system is fundamental for technological catch-up and innovation edge, as well as sustainable economic development. BAN is a new model of economic organization that has development potential, and it is an organizational innovation which deserves practice. With the help and catalyze of BAN, SMEs which is essential for sustainable development, could obtain support services in a more sufficient and easier way, sustainable economic prosperity therefore is available to achieve.

ACKNOWLEDGEMENTS

We would like to thank Doctor Jianhua Zhang for his constructive comments and useful help.

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