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Abstract

Although the importance of the incubator mangers for successful incubation has been widely discussed, there is little evidence on how the incubator mangers leverage various resources contributing to incubation success. The purpose of this paper is to fill this gap by employing the niche manger theory to investigate the extent to which the incubator managers act as the niche manager in the incubator context. More specifically, an evaluation is made to explore the influences of expectations, networks, and learning constructed by the incubator managers on the incubation performance. Using data on the 189 national technology business incubators (NTBIs) from 2008 to 2012 in China, we find that the role of networks constructed by the incubator mangers in stimulating the survival of new ventures is not as significant as the roles of expectations and learning construction. More specifically, the venture capital obtained from private organizations performs better than the incubation fund which is mainly obtained from governments. While the internal network building has a great positive impact on incubation performance, the external network tends to act as "bad networks". Finally, the incubator managers are always not sufficient to offer technology broke support in Chinese NTBIs.

Keywords: Incubator managers, strategic niche management (SNM), niche manager, incubation performance, technology business incubators (TBIs), China.

1 INTRODUCTION

Incubator managers are the ones to manage or macro-manage (Hackett & Dilts 2004a) the incubator activities. Despite the diversity of incubator mangers (Scillitoe & Chakrabarti 2010; Rice 2002; Siegel et al. 2003c), the incubator managers are defined here as the incubator top managers and incubator staff (Rothschild & Darr 2005; Bergek & Norrman 2008).The best reason of business incubator is to allow the affiliated new ventures to take advantage of the incubator managers' superior knowledge and experience which could create the potential for incubatees to add value (Rice 2002). The services and supports the incubator provides to the incubatees depend mainly on the incubator managers, on their own knowledge and competencies, and on the networks of relationships that they bring to the incubatees (Grimaldi & Grandi 2005). Furthermore, incubator mangers could enhance the reputation of fledgling firms with limited social/business networks, which might help them attract additional financial capital and better employees (Siegel et al. 2003c). Previous research suggests that interaction with incubator managers can reduce the uncertainty of new ventures and promote their survival and growth (Scillitoe & Chakrabarti 2010). Thus, incubator managers are always the central hub in the whole incubator environment/community as they serve as a primary source of social capital for incubatees and provide their knowledge and expertise as well as access to their networks of contacts (Hansen et al. 2000; Sá& Lee 2012). As a result, the ability of the incubator mangers as a beneficial resource for each incubatee is contingent upon the time allocated by the incubator mangers to firm development, the intensity of engagement or interactions with the incubatees, and the comprehensiveness and quality of services provided by the incubator managers (Rice 2002; Scillitoe & Chakrabarti 2010; Hackett & Dilts 2004a).

Although the importance of the incubator mangers for successful incubation has been widely discussed (Hansen et al. 2000; Mian 1996; Rice 2002; Sá& Lee 2012; Scillitoe & Chakrabarti 2010), there is little systematic empirical evidence on how the incubator mangers leverage various resources and contribute to incubation success. The purpose of this paper is to fill this gap by applying the theory of strategic niche management (SNM) into the incubation situation and investigating the extent to which the incubator managers act as the niche manager in incubators. More specifically, we attempted to evaluate the influence of expectations, networks, and learning constructed by the incubator mangers on the incubator performance. The empirical evidence focuses on national technology business incubators (NTBIs) from 2008 to 2012 in China, a country had ranked only second to the United States in the world in terms of the number of TBIs by the end of 2007 (MOST 2007).

The remainder of the article is organized as follows. In the next section we start by reviewing literature on the theory of SNM and business incubators. Hypotheses are derived and tested in the empirical part of the paper. Section 3 describes the stylized facts for the TBIs in China. The empirical results are presented in section 4. Finally, the study ends with conclusions, implications and limitations.

2 LITERATURE REVIEW

Despite the important role that new technology-based firms (NTBFs) play in the development of economies - as a major source of sales, new jobs, and innovation in most economies (Peña 2004; Colombo & Delmastro 2002; Siegel et al. 2003c; Phan et al. 2005), these young firms are often fragile and many unfortunately do not make it through their first critical years (Peña 2004; Colombo & Delmastro 2002; Bøllingtoft & Ulhøi 2005; Hackett & Dilts 2004a; 2004b; Chen 2009). In many cases, new ventures have to overcome several barriers to survive due to small sizes, inexperience, poor management, high overhead, insufficient financial capital, and so on (Siegel et al. 2003c; Hackett & Dilts 2004b; Chan & Lau 2005; Bergek & Norrman 2008; Colombo & Delmastro 2002; Chen 2009). One estimate of the failure rate for new ventures is 40% in the first year and 90% over 10 years (Peña 2004). Aerts et al. (2007) argues that on average one out of three new European companies fails before the second year of its existence, and 50-60% of them does not survive the seventh year. This problem is especially severe in China. The estimated failure rate for the initial entrepreneurial attempt is as high as 90% in 2010 (Song et al. 2013). Evolutionary theorists argue that the forces of selection that eliminate uncompetitive firms are necessary for the maintenance of healthy population of organizations (Aldrich 1999). However, the wide spread of the business incubators all over the world suggests that many countries believe that it is desirable to try to help these "weak-but-promising" ventures to avoid failure by incubating them until they have developed self-sustaining business structures (Lalkaka & Shaffer 1999). As business incubators are often publicly funded (Aernoudt 2004; Aerts et al. 2007; Peña 2003; Phillips 2002), most incubators are part of the regional governments and more or less have a public role (Barbero et al. 2012). Thus, many supportive services provided by incubators are for free or at a fee significantly below market prices (Bruneel et al. 2012; Allen 1990). These supports make up protected environment in which new technologies and ventures are incubated gradually before they successfully graduate (i.e., financially viable and freestanding). In a word, the primary function of business incubators is to create a protected environment, shielding the new and fragile technologies and ventures from mainstream market selection (Aernoudt 2004; Hackett & Dilts 2004a; 2004b; Aerts et al. 2007; Hannon 2005; Phan et al. 2005).

By comparison, the niche is defined as a protected environment where radical innovation emerges (Geels 2002; 2005a; 2005b; 2006; Geels & Schot 2007; Kemp & Romans 2007; Berkhout 2002). According to the niche literature, a niche acts as an "incubation room" protecting radical innovation against mainstream market selection in the regime level (Geels 2005b; Schot 1998; Kemp et al. 1998). Such protections are of great importance because the new technology usually emerges as "hopeful monstrosity", i.e., low price/performance ratio, high cost, unavailable complementary technologies and so on (Geels 2005b). The protections provided by the niche can take several forms, including government preferential treatment, R&D commitments by firms, or prospective actors' willingness to invest in the innovations on an unpaid basis (Caniëls & Romijn 2008). It is notable that the protections will be dismantled in order to avoid permanent-dependence and promote increasing competitiveness (Geels 2005b; Raven 2006).

Thus, the business incubator can be regarded as a kind of niche, especially in the case of technology business incubators (TBIs) which focus exclusively on promoting NTBFs. As the niche is important for the creation, growth and success of new technologies, several scholars have investigated more

precisely how to accelerate the development and success of the new technologies within the niche environment (Kemp et al. 1998; Van der Laak & Raven 2007; Smith et al. 2005). The origins of strategic niche management (SNM) can be traced backed to the early 1990s, and emerged from the observation that many sustainable technologies never leave the laboratory or showroom (Van der Laak 2007; Van Eijck & Romijn 2008). According to Kemp et al (1998), "SNM is the creation, development and controlled phased-out of protected spaces for the development and use of promising technologies by means of experimentation, with the aim of (1) learning about the desirability of the new technology and (2) enhancing the further development and the rate of application of the new technology". The SNM theory has been applied, verified and improved with various case studies in many fields such as wind turbines, battery powered vehicles organic food, renewable energy technologies, biogas energy technologies (Smith 2006; Tsoutsos & Stamboulis 2005; Geels & Raven 2006), and biomass co-firing (Raven 2005). Furthermore, many scholars argue that there exists the niche manager who should do SNM (Kemp et al. 1998; Caniëls & Romijn 2006; 2008). According to Kemp et al (1998), different actors may be the niche manager: national and/or local governmental institutions, non-governmental organizations, a regulatory agency, a private firm, a special interest group or an independent individual, depending on who is best qualified to take on this task, which will vary from case to case. In reality, the governments (local, regional or state governments) always take on the role of niche manager because of their strong public roles (Kemp et al. 1998; Smith et al. 2005). According to SNM literature, niche manager should promote "three internal niche processes" which are important for the stability and maturity of niche, i.e. voicing and shaping of expectations, networks formation, and learning (Schot 1998; Raven 2006; Caniëls & Romijn 2006; 2008).

The first process is voicing and shaping of expectations. The actors such as entrepreneurs, firms, governments, universities, banks, venture capitalists, users support the innovation on the basis of expectations (Caniëls & Romijn 2008). The articulation of expectations is of vital importance to attract attention and resources as well as new supporters, in particular when the technology is still in early development and the performance are still unclear (Van der Laak et al. 2007). More specifically, when a new technological opportunity emerges, the advocates (early niche manager) will articulate promises about future performance and functionality to attract attention from sponsors. When these promises are acknowledged, they are further translated into shared expectations for the new technology. Then, the expectations are translated into objectives, specifications, requirements and task divisions. Sponsors invest money and other resources available into these new technologies with low initial return. Thus, articulating expectations provides the legitimation for the actors to invest resources in the new technology without any or with just limited present-day market value (Raven 2006).

For business incubators, when the innovation or start-ups emerge, the incubator mangers will screen the potential incubatees on a set of factors (Aerts et al. 2007) which are decided by the sponsors. In most cases, a business incubator has multiple sponsors (such as national and local governments, universities, corporations, venture capitalists) with different interests (Mian 1996). As a result, an incubator may advertise several objectives depending on the interests of the sponsors, or at least make "different priorities" (Bøllingtoft & Ulhøi 2005), e.g., accelerating the survival and success of NTBFs, supporting technology transfer and research commercialization, promoting local economic development and job creation, and acquiring profit, etc) (Peña 2004; Hackett & Dilts 2004a; Chen 2009; Rothaermel 2005a; 2005b; Thursby et al. 2001; 2002a; 2002b; Westhead & Storey, 1995). When the innovation or start-ups are accepted, incubator managers will use the incubator resources to

support the "new babies" (Aernoudt 2002). Thus, the stronger the expectations constructed by incubator managers, more resources will be invested into the incubatees, and we propose:

Hypothesis 1: Expectations will be positively related to the incubation performance.

The second process is the formation of social networks. In the early development of new technology, the supporting networks are fragile and unstable (Van der Laak 2007). According to Caniëls & Romijn (2008), social networks are important because they sustain development, articulate new requirement and demands, and enable diffusion of lessons and experiences between actors. Building social networks is considered good when the network is broad, including firms, entrepreneurs, policy makers, scientists, users, producers, and other relevant actors. SNM literature emphasizes the importance of networks for successful niche development and ultimately the development of new technologies (Caniëls & Romijn 2006; Verbong 2010).

In fact, the incubator itself is a network. According to Hackett & Dilts (2004a; 2004b), it is more important to keep in mind the totality of incubator, i.e., the incubator is not simple a shared-space infrastructure; it is also networks of actors including incubator mangers, incubatees, entrepreneurs, employees, higher education institutions (HEIs), national and local governmental institutions, professional services providers such as lawyers, accountants, consultants, marketing specialists, venture capitalists, angel investors, and so on (Mian 1996; Westhead & Storey 1995; Siegel et al. 2003c; Rothaermel & Thursby 2005a； 2005b; Scillitoe & Chakrabarti 2010; Hackett & Dilts 2004b; Bergek & Norrman 2008; Schwartz & Hornych 2010). Research on the impact of business incubator underscores the importance of the incubator as a platform to help incubatees establish cooperation relationship with a broad range of actors (Schwartz & Hornych 2010; Bergek & Norrman 2008). These network contacts are important since they significantly augment and exceed the few contacts of these new ventures, serving as a valuable source of knowledge and new networking opportunities (Hansen et al. 2000). Incubatees with more chances to access network sources of knowledge will have a greater potential to succeed (Hansen et al. 2000, Scillitoe & Chakrabarti 2010). Thus, we propose:

Hypothesis 2: Networks will be positively related to the incubation performance.

The third process identified in SNM is the learning process which is widely recognized as crucial for successful innovation (Van der Laak 2007). According to Verbong et al. (2010), the learning process is characterized by a strong focus on improving technological and social performance, and finding appropriate application domains. Learning is related to learn about the relevant dimensions of the new technology, including the technology itself, markets, production, government policy, symbolic meaning, infrastructure, and so on (Smith et al. 2005). In other words, the learning process enables the adjustment of the technology and the societal embedding to increase chance of successful incubation (Raven 2006). Thus, the more learning process occurs, the more likely it will be for new promising technologies to develop and gain ground in the market (Caniëls & Romijn 2008).

According to incubator literature, NTBFs typically lack the necessary management experience and technical skills and therefore may have limited chances for survival (Siegel et al. 2003c; Hackett & Dilts 2004b). However, based on the services provided by incubator managers, the incubatees may avoid trials and errors and ascend more quickly the learning curve (Burneel et al. 2012). The services provided by incubator managers are becoming more and more comprehensive. For example, Aerts et al. (2007) argue that the European incubators mainly provide 23 kinds of services, including business planning and forming a company, market advice, financial advice, information service, accounting,

legal and other related services, etc. And Chinese incubators provide about 15 kinds of services (Sun et al. 2005). Many scholars have confirmed the critical role of the services provided by incubator mangers in assisting new ventures (Peña 2004; Chan & Lau, 2005; Aerts et al. 2007). Thus, similarly to the above arguments for expectations and networks, we propose:

Hypothesis 3: Learning will be positively related to the incubation performance.

3 BACKGROUND INFORMATION

In this section, we start with some basic facts about the Chinese TBIs. In China, the majority of TBIs are established as publicly funded vehicles for supporting the development of new- and high-technology firms. Figure 2 shows the evolution over time of the number of TBIs. In comparison with developed countries, China has been a laggard in the development of such initiatives. The first Chinese TBI, the Wuhan Eastlake Hi-tech Innovation Center, was established in 1987. The TBIs movement did not take off until the early 2000s: between 1999 and 2012 the number of TBIs rose from 110 to 1239.

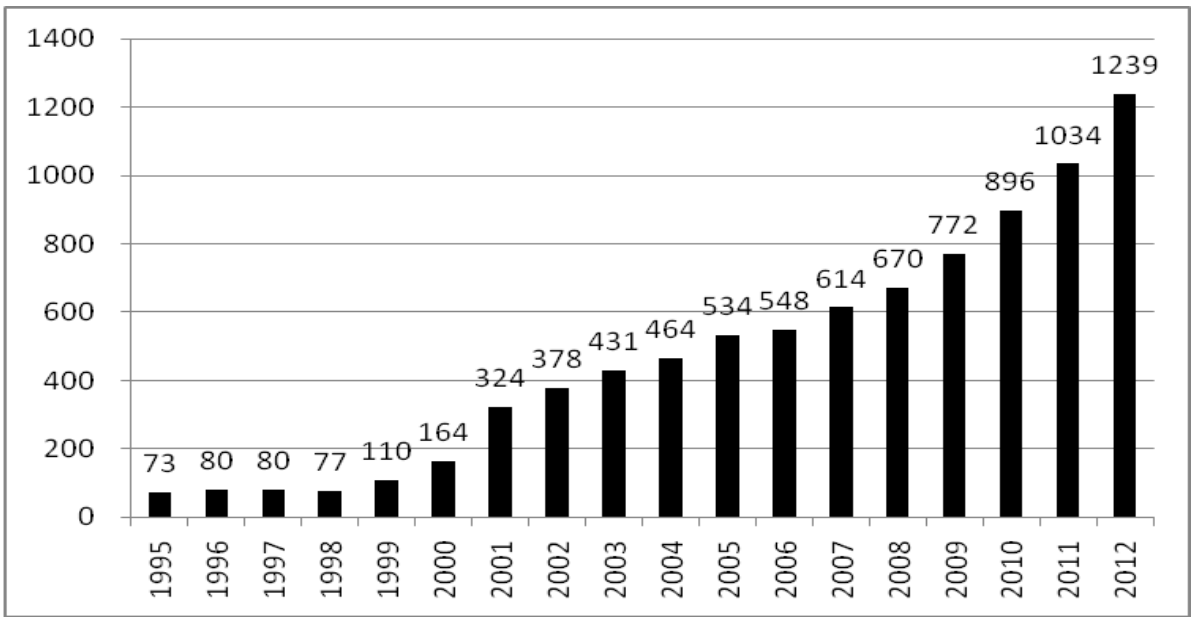

Figure 1. The number of TBIs in China from 1995 to 2012.

However, the size of TBIs in China is large compared with their US and European counterparts. In 2012 alone, Chinese TBIs provided rental space of 43,000,000 m^2 which supported 70,000 new ventures with 20 employees each, creating 1,430,000 jobs, and generating annual revenue of more than 490 billion yuan. According to Figure 3, the number of incubatees within TBIs grows rapidly from 1854 in 1995 to 70217 in 2012. During the last two decades, the TBIs in China have generated about 49,000 graduates.

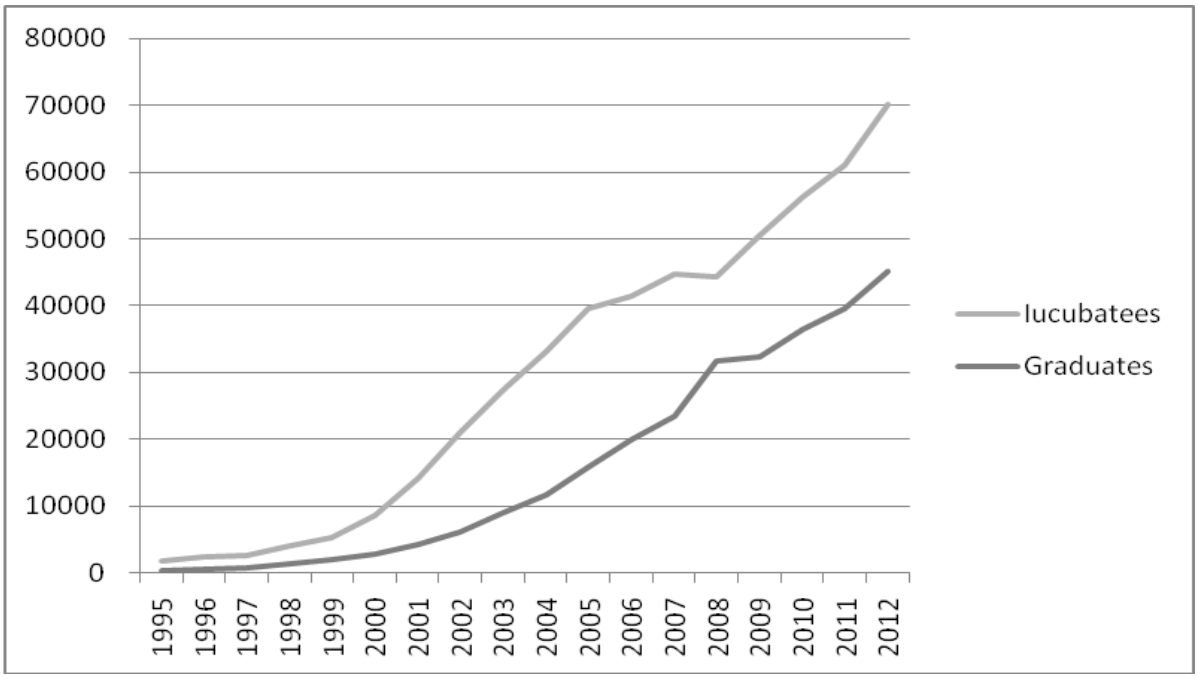

Figure 2. The number of incubatees and accumulated number of graduates.

In China, most TBIs are initiated by national and/or local government agencies. The purchasing of land and the initial investment in infrastructure for TBIs are partially financed by these official institutions. To specifically define and manage the development of TBIs, the Ministry of Science and Technology (MOST), a government institution in charge of TBIs, has enacted a decree listing a range of standards, and the TBIs having met these standards are given the title of "National Technology Business Incubators" (NTBIs) and enjoy favorable public images, additional financial support (especially governmental support) and other resources. For example, according to the decree, the number of incubatees located in the NTBIs shall surpass 80, and the proportion of incubatees with intellectual property shall be more that 30%. With respect to selection criteria, the tenant firm's age at entry shall be less than 24 months. To become a graduate, a incubatee must meet at least two of the following three criteria: (a) the incubatee shall have acquired intellectual property; (b) the annual revenue generated by incubatee shall have been over 10 million yuan for 2 consecutive years; (c) the incubatee shall be merged or acquired, or go public and become a listed company at home or abroad. Such national status qualification is assessed every year, and if the NTBIs fail to meet the standards for two continuous years, the qualification of "NTBIs" will be revoked.

As the general TBIs do not usually employ the same relatively stringent criteria that the NTBIs use, our empirical study focuses on the NTBIs. Although the number of NTBIs changes every year, there are 189 incubators keeping their status of "NTBIs" throughout all the five years (2008-2012). Thus, our data focus on above 189 NTBIs from 2008 to 2012 (i.e., N=945). The data mainly stem from the 2008-2012 "China Torch Statistical Yearbook", and the homepage and brochure of each NTBI.

4 EMPIRICAL RESULTS

This section investigates the impacts of the expectations, networks, and learning constructed by the incubator mangers on the incubation performance. In order to test the three hypotheses empirically, a panel data analysis is conducted.

4.1 Measures

Dependent, independent, and control variables are used in this study, and to smoothen these variables, we take the natural logarithm of all variables (except dummy variables). The measurement of each variable is described as follows. As noted above, the business incubators function as a remedy for market failure in terms of facilitating the survival of new and fragile companies. As a result, the universal purpose of an incubator is to promote the survival of the new ventures (Allen 1985), and then, benefit for local economic development, job creation, technology transfer, profit generation, and so on (Grimaldi & Grandi 2005; Ratinho & Henriques 2010; Bruneel et al. 2012; Chan & Lau 2005; Bøllingtoft 2012; Phillips 2002; Siegel et al. 2003a; 2003b; Bakouros 2002; Allen 1990; Westhead & Storey 1995). We therefore employ the survival rate (SUR) as the proxy for the incubation performance, which is also one of the most common used indicators in incubator literature (Barbero et al. 2012; Aerts et al. 2007; Peña 2004; Allen 1990) (see Table 1).

The expectations are related to the resources invested into the incubators by sponsors. One important milestone in the development of nascent technology firms is obtaining financial capital (Shane & Cable 2002). The incubation fund (FUND) are important for the establishment of NTBIs and are always supported by multiple sponsors, including national and local government agencies, higher educational institutions (HEIs), corporations, individuals, etc. Also, the role of venture capital (VENCAP) for successful incubation of new ventures has been widely discussed (Phillips 2002; Chan & Lau 2005; Rothaermel 2005a; 2005b; Ratinho & Henriques 2010). We use the incubation fund and venture capital per incubatee received as the proxy for the expectations constructed by incubator managers (see Table 1).

Secondly, the networks are of great importance for the new ventures (Bøllingtoft & Ulhøi 2005; Hackett & Dilts 2004a; 2004b). Several incubator literature associate the firm development with the incubator mangers' building of internal networks (i.e., cooperative networks among incubatees), and external networks (i.e., networks between incubatees and external organizations, such as national and local government agencies, HEIs, potential collaborators, and various professional services organizations) (Colombo & Delmastro 2002; Aernoudt 2004; Peters et al. 2004; Bøllingtoft & Ulhøi 2005). With respect to the internal networks (INNET), as the amount of knowledge spillover is positively proportional to the number of firms (Hu 2007), and geography proximity can influence the frequency of contact and thus development of networks among incubatees (Bøllingtoft 2012), we use "number of incubatees per square meter within the NTBIs" as the proxy for the internal networks leveraged by the incubator managers. For external networks (EXNET), as all the NTBIs have linkages with governments more or less, we only use a dummy variable to describe HEIs networks (Yes=1, No=0) (Rothaermel & Thursby 2005a; 2005b) (see Table 1).

Finally, the learning is primarily related to the services provided by the incubator mangers. Some authors divide these services into business assistance (i.e., entrepreneurial training/coaching and

business development advice, as well as general business matters such as business planning, tax assistance, personnel recruiting, marketing, advertising, accounting, financial assistance, and so on) and technical assistance (i.e., access to technology transfer processes, research and technology supply pipelines, intellectual proprietary protection, technological know-how skills, patent application, and product testing) (Chan & Lau 2005; Aerts et al. 2007; Scillitoe & Chakrabarti 2010). Herein, based on the information from the website and brochure of each NTBI, business assistance (BUSASS) and technical assistance (TECHASS) are both bivariate variables taking on the value of 1 if the incubator mangers in NTBIs provide any type of the assistances described above, and 0 otherwise (see Table 1).

In addition to the independent variables, we include several control variables that potentially could influence the survival of new ventures. For instance, the incubator age (AGE) may be an important factor. Bruneel et al. (2012) argues that the newly established business incubators are doing better than the older ones. We use a metric variable that measures NTBIs' age in years at the time of 2013 (Schwartz & Hornych 2010).The quality of incubatees (QUALFIRM) and incubator mangers (QUALMAN) may also be relevant (Peña 2004; Rice 2002). The first variable is measured as "the proportion of employees who have tertiary education out of all the employees in the firms". And QUALMAN is measured as "the proportion of employees who have tertiary education out of incubator managers". The operational measurements are presented in Table 1.

Variables	Abbreviation	Definitions	Operational measurements
Dependent variables	SUR	Firm survival	The survival rate of the incubatees (i.e., number of graduates / number of incubatees) (%).
Control variables	AGE	Incubator age	A metric variable that measures NTBIs' age in years at the time of 2013 (year).
	QUALFIRM	Quality of incubatees	The proportion of employees who have tertiary education out of all the employees in the firms (%).
	QUALMAN	Quality of incubator managers	The proportion of people who have tertiary education out of incubator managers (%).
Expectations	FUND	Incubation fund mainly stemming from governments and HEIs.	The received incubation fund per firm (incubation fund/number of firms) (1000 yuan)
	VENCAP	Venture capital stemming from venture capitalists	The received venture capital per firm (venture capital/number of firms) (1000 yuan)
Networks	INTNET	Internal networks	The density of firms located in the NTBIs (number of firms/rental space) (n/m^2)
	EXTNET	External networks	A dummy variable to describe HEIs-linkage (Yes=1, No=0)
Learning	BUSASS	Business assistance provided by incubator managers	Bivariate variables taking on the value of 1 if the incubator managers provide any type of the assistances described above, and 0 otherwis

	TECHASS	Technical assistance provided by incubator managers	Bivariate variables taking on the value of 1 if the incubator managers provide any type of the assistances described above, and 0 otherwis

Table 1. The operational measurements of each construct.

4.2 Regression analysis results

Descriptive statistics of all variables are presented in Table 2. On average, the survival rate (SUR) of Chinese NTBIs is only 10%, and the mean age of NTBIs (AGE) is 14 years old. It not surprising that the average proportion of employees with tertiary education in incubator managers (QUALMAN) are all above 90%, which is one of the qualification requirements for "NTBIs" according to the decree. The venture capital (VENCAP) per incubatee received is higher than that of incubation fund (FUND). Meanwhile, more than half NTBIs have linkages with HEIs. Also, the majority of incubator managers provide business assistance and technical assistance, and providing business assistance is more common across the whole NTBIs.

	N	Mean	S.D.	1	2	3	4	5	6	7	8	9
SUR	945	0.10	0.08									
AGE	945	14.41	4.72	-0.13***								
QUALFIRM	945	0.74	0.17	0.25***	-0.02							
QUALMAN	945	0.92	0.12	-0.04	-0.03	0.07**						
FUND	945	158.51	605.43	-0.00	-0.01	-0.00	0.04					
VENCAP	945	754.55	1663.27	0.17***	-0.03	0.09**	-0.01	0.00				
INTNET	945	0.003	0.001	0.15***	-0.09**	0.09**	-0.04	-0.08**	0.03			
EXTNET	945	0.66	0.48	-0.01	-0.09**	0.00	-0.04	0.04	0.04	0.03		
BUSASS	945	0.81	0.38	0.18***	-0.15***	0.00	0.11***	0.04	0.00	0.08**	-0.16***	
TECHASS	945	0.78	0.41	0.07*	-0.13***	0.12***	-0.02	-0.15**	0.02	0.04	0.00	0.04

Notes: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 2. Descriptive statistics and bivariate correlations (N(obs=945)).

Table 3 displays the regression results. Model 1 is the base model that includes the three control variables, and the model explains 10.8% of the variance. Some of the results for the control variables are noteworthy. The significantly negative relationship between incubator age and the incubation performance indicates that the newly established NTBIs in China have higher survival rate than their

older counterparts. Similarly, the quality of incubatees (QUANFIRM) has a significant positive influence on the incubation performance (Ravichandran et al. 2005; Wade & Hulland, 2004). According to co-production theory, when the incubatees are not strong enough, incubation performance will not be good, no matter how superior the incubator managers or the infrastructures might be. In other words, the incubation performance is not only determined by the incubator managers, but also by the abilities and involvement of the incubatees in using the programs. It is not surprising that the influence of the quality of incubator mangers (QUALMAN) is not significant, since the average proportions of employees with tertiary education in incubator managers in NTBIs are all above 90% (see Table 2).

Model 2 presents the results of the dependent variable, survival rate, regressed on the control variables and expectations variables. The results reveal that the expectations explain 2.7% of the variance (i.e., R^2=0.135-0.108=0.027). Table 3 shows that the venture capital (VENCAP) has a significant positive impact on incubation performance, while the influence of incubation fund (FUND) is not statistically significant. Hence, hypothesis 1 is moderately supported. Unlike the incubation fund mainly obtained from the governments for non-commercial purpose, the venture capital is provided by the private organizations and is used more effectively to maximize profit. Rothaermel & Thursby (2005) argue that venture capital takes on an important signalling role as it often bestows legitimacy upon the new ventures. Moreover, incubator managers may spend some of the incubation fund on incubators' operational issues such as fundraising, hiring staff, and marketing, which have a negative influence on the affiliated ventures (Hackett & Dilts 2004a; Rice 2002). It is therefore not only to build and shape strong expectations, but how to use these expectations is also important.

When the third set of variables (i.e., networks variables) are added in Model 3, the explanatory power of the extended model did not experience a substantial increase (i.e., R-square=0.142-0.135=0.007), which indicate that the role of networks constructed in stimulating the survival of NTBFs is not significant as compared to the role of expectations. According to Table 3, while the internal network (INNET) has the biggest positive impact on incubation performance, the influence of external network (EXNET) is negative (although the result is not statistically significant). As a result, hypothesis 2 is partially supported. In fact, Chinese NTBIs have more incubatees than their US and European counterparts, and some Chinese scholars argue that more and more incubatees begin to realize the importance of synergies between the firms "in-house" (Zhou, 2011). It is surprising that the external network conducted by the incubator mangers in NTBIs tend to be consistent with what Peter et al (2004) called "bad networks". One possible explanation is that the new technology flows from the local universities to incubator firms are typically quite embryonic and high risky (Thursby et al. 2001; 2002a; 2002b). According to the survey conducted by Thursby et al. (2002a), almost half of the university inventions are no more than a proof of concept when they are licensed. Furthermore, the universities are less than fully committed to the technology transfer process (Thursby et al. 2002a). Sometimes the universities transfer the inventions, and then have little or no ongoing involvement in the intervention (Phillips 2002).

In Model 4, we add the learning factors as the main effect variable. The results show that the model explains an additional 2.6% of the variance (i.e., R^2=0.168-0.142=0.026). While the business assistance provided by the incubator mangers significantly positive associate with the survival of incubatees, the impact of technical assistance is not significant. As a result, hypothesis 3 is partially supported. This finding somewhat contradicts the view that incubator managers can support the

technological development of incubatees directly. In our sample, most of the NTBIs are diversified business incubators (DBIs), and unlike specialized business incubators (SBIs), the incubator managers within DBIs often lack the detailed technological expertise directly related to the core technology of the incubatees, so the expertise of the incubator managers are not sufficient to offer technology broke support (Schwartz & Hornych 2008; 2010; Von Zedtwitz & Grimaldi 2006; Vanderstraeten & Matthyssens 2012).

	Model 1. Control variables	**Model 2.** Adding expectations variables	**Model 3.** Adding networks variables	**Model 4.** Adding learning variables
Constant	0.164(0.032)	0.105(0.034) **	0.089(0.035) *	0.035(0.037)
Control variables				
AGE	-0.052(0.008) ***	-0.052(0.008) ***	-0.050(0.008) ***	-0.039(0.009)* *
QUALFIRM	0.139(0.016) ***	0.129(0.015) ***	0.123(0.016) ***	0.122(0.015) ***
QUALMAN	-0.032(0.022)	-0.027(0.021)	-0.025(0.021)	-0.038(0.021) **
Expectations				
FUND		0.004(0.002)	0.004(0.002)	0.004(0.002)
VENCAP		0.008(0.001) ***	0.008(0.001) ***	0.008(0.001) ***
Networks				
INTNET			4.421(1.515) **	3.829(1.495) ***
EXTNET			-0.005(0.005)	-0.000(0.005)
Learning				
BUSASS				0.039(0.007) ***
TECHASS				0.005(0.007)
Adj. R-square	0.108	0.135	0.142	0.168

Table 3. Hierarchical regression results

Notes: standard errors in parentheses; N=945; * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

4 CONCLUSIONS

According to the incubator literature, developing theory to characterize the precise nature of the managerial practice of incubator mangers beyond simple descriptions has not proceeded very far. This study draws upon the strategic niche management (SNM) theory and evaluates the extent to which the incubator managers act as the niche manager in the incubator context. More specifically, we assess the role of incubator mangers' construction in terms of expectations, networks, and learning. The results indicate that the role of networks constructed by the incubator mangers in stimulating the survival of NTBFs is not significant as compared to the role of expectations and learning. More specifically, the venture capital obtained from "outsiders" private organizations performs better than the incubation fund which is mainly obtained from governments. While the internal network has a great positive impact on incubation performance, the external network construction tends to act as "bad networks".

Finally, the incubator managers in Chinese NTBIs are always not sufficient to offer technology broke support in Chinese NTBIs.

Furthermore, the results of the study display specific implications for incubator managers, incubatees, and policy makers. For incubator managers, although the formation of expectations, networks and learning are significant for the niche development, how to use these resources is even more important. For incubatees, they should improve their quality (i.e., the nature of entrepreneurs, the absorptive capacity of the firm, etc.) to make better use of the resources invested to them. As one of the most important sponsors in Chinese TBIs, the governments should examine the pre-conditions before investing in the incubators. Furthermore, they should pay more attention to how the incubator managers arrange these resources.

A certain degree of caution is recommended when our findings are interpreted our results. With respect to the empirical analysis, as the three niche processes may need to take some time to be effective, the time-lag effect should be considered in the future research. There are also several theoretical limitations. Firstly, the niche is geared to radical innovation (Geels 2005a; 2005b). However, not all the new technologies in an incubator belong to radical innovation, although the difference between radical innovation and incremental innovation is still ambiguous (Genus & Coles 2008). Secondly, if we distinguish different niches based on the radical innovation, an incubator may consist of many different overlapped niches. Thirdly, the radical innovation in the niche always demands a long time to be mature, but the incubation period is only about 2-7 years (Bruneel et al. 2012). With all these shortcomings and limitations in mind, we can regard the incubation activities as a part of the whole process of niche development, and we believe that our study offers a new perspective for considering the functions and processes of business incubators and the incubator mangers.

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