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A typology of university research park strategies: What parks do and why it matters



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ABSTRACT

A growing body of research examines whether and how university research parks (URPs) enhance the performance of their tenants and foster regional innovation. As the findings in the literature are inconclusive, we argue that the URP construct requires closer conceptual examination, especially in regards to URP strategies. This paper highlights the limitations of treating URPs homogeneously and theorizes how URPs' strategies vary and arise. We develop a conceptual model, a typology, based on URP's industry specialization and development services, of four types of URP strategies. The model shows how URP strategies can vary in theoretically important ways to generate URP internal and external strategic fit.

1. Introduction

University research parks (URPs) are property-based developments that accommodate and foster the growth of tenant firms. Unlike other research, science and technology parks, URPs have an affiliation with a university based on proximity, ownership, and/or governance (Link and Scott, 2007). The lure of the outcomes and success of early URPs such as the Stanford Research Park (affiliated with Stanford University) and the Research Triangle Park (affiliated with Duke University, North Carolina State University, and the University of North Carolina at Chapel Hill) have fuelled a dramatic growth in the formation of URPs around the world (Battelle, 2007). However, research examining the performance of URPs (and their tenant firms) has been inconclusive. While some studies have shown a positive impact of URPs on the economic performance of tenant firms (Leyden et al., 2006; Link and Scott, 2003b; Yang et al., 2009) or on the flow of knowledge between universities and URP firms (Colombo and Delmastro, 2002; Fukugawa, 2006; Link and Scott, 2003b), other studies suggest that the impact of URPs on tenant firms is ambiguous or even negative (Felsenstein, 1994; Ferguson and Olofsson, 2004; Quintas et al., 1992; Fukugawa, 2006). In fact, it has been argued that the evidence in support of URP impact “is mixed no matter the unit of analysis, the measure of performance and the specific econometric tool used” (Squicciarini, 2008: 48). For some, this inconsistency of results suggests URPs might not be the seedbeds of innovation that we would like to think they are, and that they are simply “high-tech fantasies” (Massey, 1991).

We believe however, that the root cause for the inconsistency is that, surprisingly, the extant literature offers little theoretical guidance on how URPs can vary in terms of their strategy. In other words, URPs may also differ in terms of “what they do” and “how they do it”, in terms of serving their tenant firms, universities and regions. Arguing that URPs should not follow a “one size fits all” approach to their strategic position (Wagner and Sternberg, 2004), scholars have called for more theorizing on how and why park strategies differ and the impact of these differences (Chan and Lau, 2005; Phan et al., 2005; Quintas et al., 1992). For instance,

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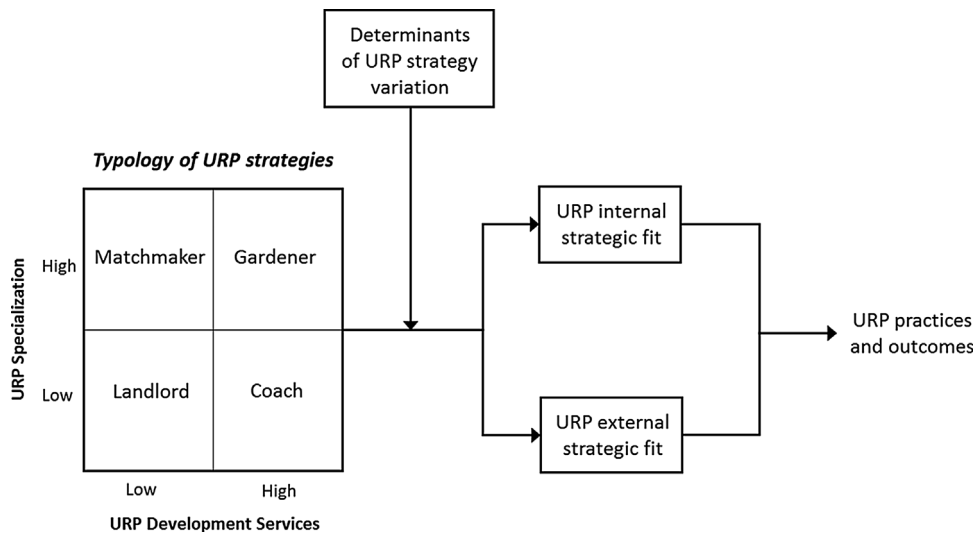


Fig. 1. The model: understanding URP strategies.

choices of park strategy might need to be tailored to suit the conditions of their region as “the environments required for the emergence of productive entrepreneurship are likely to differ significantly between a rural area, a high-technology cluster, and a metropolitan area” (Minniti, 2008: 782). Addressing these calls for how and why URPs’ strategies vary is a critically important issue for universities, potential tenant firms, the communities in which they operate and public policy (Langford et al., 2006). In response to these calls, we provide this conceptual paper and propose a typology and related theory on the strategies of URPs. This approach is similar to the seminal work of Miles et al. (1978) and Miles and Snow (1984) and other studies (Zahra and Pearce, 1990; McCarthy et al., 2010; von Nordenflycht, 2010) that provide typologies of the different strategic positions organizations can adopt to ensure external fit (between the strategy and the environment) and internal fit (between the internal resources/capabilities and the strategy) to enhance performance.

Fig. 1 depicts the overall structure of our model. Based on a review of the URP literature and related phenomena, including research, technology and science parks; incubators; and technology accelerators (university affiliated and not), we begin by characterizing URP strategies using two fundamental dimensions: specialization and development. We then use these two dimensions in a typology to propose four archetypal URP strategies and provide illustrative examples for each. Next, we present three potential explanations for why URPs have different strategies. These are due to (i) heterogeneity of the local environment within which a URP operates; (ii) differences in the internal capabilities, mission and objectives of the university with whom the URP is affiliated; and (iii) differences in the experience, knowledge or competence of URP managers or management teams. We conclude by explaining how different capabilities, strategies and environments work to impact the URP strategic fit, and outline the implications of our theory for policy, management and scholarly work.

2. Characterizing the strategies of URPs

University research parks (URPs) are generally defined as being property-based developments that accommodate and foster the growth of tenant firms and are affiliated with a university based on proximity, ownership, and/or governance (Link and Scott, 2007). We follow the definition provided by Link and Scott (2007), in that a URP simply needs to have some association with one or more universities. For instance, if a regional development entity, government agency, real estate developer or high technology company sets up a park in collaboration with a university, then this affiliation qualifies the park as a URP.

The most common expectation of this university-park affiliation is that the URP and its tenants will have some form of access to university resources (e.g., knowledge, talent, and equipment), which is assumed to promote the growth of tenant firms and foster local economic development (Battelle, 2007; Link and Scott, 2005, 2006; Lofsten and Lindelof, 2002; Mian, 2011). It is also argued that URPs benefit their universities by helping to facilitate the commercialization of university research. This in turn helps universities to attract funding and preeminent scholars, which increases publication and patent output (Link and Scott, 2003a). This connection to a university and the expected benefits thereof are important distinctions that URPs have over other research, science and technology parks not affiliated to a university (Lofsten and Lindelof, 2002).

Research on URPs has typically treated these entities as a homogeneous set in terms of strategy (i.e., the decisions that are implemented concerning the aims and operation of a URP). To a degree, and in terms of the mandate of URPs, this is reasonable. Like science, technology, and industry parks that are *not* affiliated to a university, URPs function as a real estate provider and landlord, developing and renting office and lab space. However, as reported by one of the few studies to characterise these entities in general, one director of a research park commented on their diversity: “If you’ve seen one research park ...you’ve seen one research park.” (Link and Scott, 2006: 54). While we acknowledge that individually all URPs are unique to some degree, we believe it is possible and

beneficial to classify them using theoretically and practically important dimensions.

In fact, recent research shows that variation in characteristics of a URP's affiliated university or the URP's relationship to the university can account for some differences in URP performance (Link and Scott, 2003b; Santoro and Chakrabarti, 2002; Siegel et al., 2003; Westhead and Batstone, 1998; Link and Link, 2003). These dimensions include the URPs physical proximity to the affiliated university, its governance relationship with the university (i.e., whether it is owned and/or managed by the university, government or a private third-party), the existing resources and capabilities within the university, and its mission or high-level objectives.

However, in addition to varying along these characteristics of the affiliated university, URPs can also vary based on strategic choices that respond to the internal capabilities they possess (e.g., manager's experience, available space, etc.) and the characteristics of their local environment. While URPs can be run in many ways, and little has been written with regard to URP strategic choices, it is possible to discern from other organizational and innovation literature two strategic dimensions of importance: specialization and development. Specialization is the extent to which a URP caters to a narrow versus broad type of tenant firm (e.g., Vanderstraeten et al., 2016). Development is the extent to which URPs offer services, beyond the role of landlord, to support their tenant firms (e.g., Rice, 2002). While we define and substantiate both of these strategic dimensions in more detail in the next section, we highlight here the reasoning why we selected them.

Across a variety of literatures that study mechanisms for knowledge transfer (including non-university research parks, but also incubators and accelerators,¹ university spin-offs, and even venture capital funds), these two are commonly recognized as significant dimensions of strategic choice on which these types of organizations vary. An influential report on the evolution of URPs in North America highlights these dimensions as important descriptors of URP diversity (Battelle, 2007). And research on business incubators argues that these dimensions are central to identifying best practice models for supporting new ventures (Bergek and Norrman, 2008; Vanderstraeten et al., 2016; Rice, 2002). Based on these constructs, Malek et al. (2014) explore implications of issues such as specialization and development of tenants for business accelerators, which often employ very high development and low specialization strategies. Also, Roberts and Malone (1996) use similar dimensions (support and selectivity) to explain the process by which universities strategically spinout new ventures. Langford et al. (2006) suggest that professional development services and specialization are critical strategic factors to be considered. Furthermore, research on new venture support shows that venture capitalists vary in the degree to which they choose to diversify versus specialize (MacMillan et al., 1989).

In addition to the theoretical value these dimensions have, it is clear they are important to URP management. Decisions about specialization and development are linked to crucial differences in the type and amount of resources URPs have available to attract and support tenant firms (Clarysse et al., 2005). This means specialization and development shape URPs' core strategic aspects (Norton and Tenenbaum, 1993; Sabidussi et al., 2014). For example, the availability (or not) of specialized resources within a URP and its affiliated university will be critical to attract potential tenants within a single industry or across multiple industries. Also, the amount of URP resources must be sufficient to properly deliver the promised business services. That is, the larger the range and amount of business development services offered, the larger will be the needed resource base.

2.1. URP specialization

Specialization is a form of selection in which URPs make a strategic decision concerning which types of tenant firms to accept for entry and which to reject (Bergek and Norrman, 2008; Hackett and Dilts, 2004). URPs could specialize on a number of tenant characteristics, such as the perceived quality of a tenant's business idea or the tenant's stage of development (e.g., newly founded versus financed for several rounds versus long-established). In fact, these criteria of "picking winners" based on the quality of the idea and/or the characteristics of the entrepreneurs is central to the incubators' (Bergek and Norrman, 2008) and accelerators' strategy (Malek et al., 2014). URPs could also specialize based on a specific industry (e.g., Vanderstraeten et al., 2016) due to the existence of complementary assets such as university expertise, knowledge areas of anchor tenants or capabilities within the local/regional environment. Similarly, our review of current research and public information (i.e., URP websites and public reports) revealed that URPs often specialize by different industry sectors (see Table 1). For this reason, in the remainder of the paper, we use specialization by industry, which is the extent to which a URP serves tenant firms from a specific industry. URPs' industry specialization decisions are driven by the existing internal capabilities of the associated university, the existing capabilities within the URP (e.g., experience of manager or management team) and the local environment within which the URP operates.

We describe URP strategies as "low specialization" or "high specialization" depending on the number of industries they focus on. Drawing on the business incubator literature and our review of actual URPs, we characterise high specialization URPs as those that accommodate tenant firms from one single industry, while low specialization URPs focus on multiple industries (Schwartz and Hornych, 2010). For example, the first URP in the high-specialization category in Table 1 is the Leiden Bio Science Park, which only deals with biotechnology tenant firms. In contrast, the first URP in the low-specialization category in Table 1, North Carolina's Research Triangle Park, accommodates tenant firms from a diverse set of industries including biotechnology, ICT, gaming and nanotechnology.

One fundamental implication of specialization is that it impacts the efficiencies of providing resources to tenant firms. As highly specialized URPs focus on accommodating firms from one single industry, the tenant firms will likely have similar resource needs

¹ Incubators and accelerators are both concerned with attracting, supporting and developing new ventures. Accelerators are distinct from incubators in that entrepreneurial teams must compete to be selected to join an accelerator. Also, accelerators typically accept and nurture a much greater number of start-up teams than an incubator, and the accelerator program duration is typically short (e.g., three to four months) as opposed to that for an incubator (see Malek et al., 2014).

Table 1
Examples of URPs that vary in terms of specialization^a.

Level of URP Specialization	University research park and location	Affiliated universities	Industry/technology focus	Founded	Number of tenant firms (employees)	Related studies
High	Leiden Bio Science Park, Leiden, The Netherlands	Leiden University	Biotechnology	1984	60 (3100)	van Geenhuizen and Reyes-Gonzalez (2007)
	BioRio, Rio de Janeiro, Brazil	Federal University of Rio de Janeiro	Biotechnology	1988	20 (400)	Cabral and Dahab (1998)
	University of Maryland BioPark, Baltimore, USA	University of Maryland	Biotechnology	2003	25 (550)	Carroll et al. (2010)
	Agropolis Science Park, Montpellier, France	University of Montpellier I and II and University of Avignon	Agribusiness	1986	20 (3700)	Eberlein (1996)
Low	Research Triangle Park, North Carolina, USA	Duke University in Durham, North Carolina State University in Raleigh, and the University of North Carolina at Chapel Hill	Biotechnology and life sciences, clean & green energy, gaming and e-learning, ICT and nanotechnology	1959	170 (38,000)	Link and Scott (2003b)
	Western Australian Technology Park, Perth, Australia	Curtin University of Technology	ICT, renewable energy and clean technologies, and life sciences	1985	58 (1300)	Phillimore (1999)
	Stanford Research Park, Palo Alto, USA	Stanford University	Electronics, space, biotechnology, computer hardware and software, and consulting firms	1953	150 (23,000)	Sandelin (2004)
	Hsinchu Science-based Industrial Park, Hsinchu, Taiwan	National Chiao Tung University (NCTU) and National Tsing Hua University (NTHU)	Integrated circuits, computers, telecoms, electronics, precision machinery, and biotech	1980	312 (96,293)	Lai and Shyu (2005)

^a This table provides examples of URPs with high or low specialization as reported by studies and/or the URP.

(i.e., building space and associated equipment and services). For example, a URP focused only on hosting software firms would primarily offer office space and access to state of the art information and communication technologies, while a URP focused on biotechnology firms would primarily offer access to biotech laboratories and scientific equipment and related scientific services. In fact, the difficulties of getting access to laboratories with expensive and specialized equipment can be a significant barrier to new firm formation and growth. Consequently, research reveals that, from the viewpoint of the firms, access to such physical infrastructure resources either at the URP or through the university are considered attractive and beneficial to tenant firms (e.g. Mian, 1996; Mian et al., 2012; Chan and Lau, 2005). Furthermore, as the economic literature suggests specialization leads to increasing returns (e.g., Smith, 1776, Romer, 1987), high specialization allows URP managers to acquire and offer similar resources which lead to efficiencies in terms of infrastructure maintenance and budget allocation. Conversely, URPs with a low specialization approach accommodate tenants from multiple industries, and thus their infrastructure and resource needs are more diverse.

A second key implication of specialization is associated with the availability of a pool of potential tenants. As specialization is a matter of how flexible or open a URP is to firms from different industries, this affects the number of potential tenant firms a URP can attract and host. A high specialization choice focuses on a narrower potential tenant pool that would increase the risk of not filling the URP's space (Aerts et al., 2007), and increase the risks that come with an industry-specific slow-down or crisis (i.e., all eggs in the same basket). For example, a lack of potential tenants would lead to the URP and its resources being under-utilized or having to admit tenants with no fit with the area of specialization. This can lead to a situation where URPs face a “lack of suitable investment opportunities” as a critical resource constraint to organizational growth (Penrose, 1959; Richardson, 1964; Mahoney and Pandian, 1992).

A third fundamental implication of specialization is the potential impact on tenant firm networking opportunities. It is often emphasized that networking opportunities between tenants in incubators, accelerators and non-university research parks lead to synergies, innovations and improved firm performance (Bakouros et al., 2002; Bøllingtoft and Ulhøi, 2005). In a high specialization URP, tenant firms are more likely to have overlapping knowledge and interests, which enhances the potential for networking (Mowery et al., 1998). From a personnel and social perspective, firms from the same industry will have employees that are more likely to be connected through their common skills, experiences and work goals. Furthermore, when URP firms are from the same industry they are more likely to use the same URP and university resources, and thus more likely to engage with each other (Schwartz and Hornych, 2008). However, it is important to note that when URP firms are in the same industry and directly compete against each other, this can create a high level of competitiveness that can inhibit networking (McAdam and Marlow, 2007).

In sum, the decision to specialize or not, like most choices, involves tradeoffs. High specialization offers the potential for lower cost (more efficient) provision of idiosyncratic or unique resources and more networking opportunities for tenant firms, but at the expense of having a smaller pool of potential tenants. Thus, high specialization may underlie benefits of focus, but at the risk of facing under-utilized facility and resources as well as exposure to an industry-specific slow down or crisis. A priori, both strategic choices are viable, depending on the URP's resource availability and environment, as we discuss in a later section.

2.2. URP development services

The development dimension reflects the extent to which URPs provide services to their tenant firms to facilitate their growth (e.g., Breznitz et al., 2017; Clarysse et al., 2005; Rothaermel and Thursby, 2005). It is one of the key ways in which knowledge-based resources can flow from the university and URP to tenant firms. Although managers of all URPs would likely express an interest in and hope for the success of their tenants, URPs differ tremendously in terms of the level and range of business-related services and resources they provide to help firms (Table 2). URPs can make decisions in regards to tenant development based on the experience of the manager or management team, the university characteristics (its internal resources, capabilities, mission and objectives), and the nature of the local/regional environment.

We describe URP strategies as “low development” or “high development” depending on the level of resources committed and the range of professional business services offered to tenant firms. High development URPs follow an “incubator model” (Clarysse et al., 2005) in which they establish significant, self-contained business development departments to offer expertise and resources to help promote the growth and success of URP firms. Development services include entrepreneurship education programs that aim to enhance new venture success so as to advance economic development (Fayolle et al., 2006; Franco and Haase, 2015). For example, when Aston Science Park in the U.K. was established, it offered a wide range of business-related services to its tenants such as business acceleration mechanisms, employee recruitment, training, media relations, marketing consulting, technical assistance, and networking opportunities.

In contrast, low development URPs offer limited development services, in terms of scope and/or intensity, with a very small number of staff associated with tenant development and no dedicated business services units within the URP's organizational structure. Low development URPs operate primarily as real estate ventures, mainly providing office and lab space and affiliation with the university brand. Like low development incubators, URPs adopting this strategy rely on a “sink or swim” approach where firms must succeed largely without the URP trying to engineer and shape survival (Clarysse et al., 2005). Tenants need to rely on market selection and economic motivations of service providers to fulfill business development needs. Singapore Science Park is an example of a low development URP; offering tenants little beyond its infrastructure and the reputation of associated universities.

One fundamental implication of the development choice is the costs associated with the level of resources required to provide development services offered by the URP. High development URPs will need to employ trainers and mentors to help develop their tenants in a variety of business-related areas such as finance/accounting, marketing, operations, strategy, human resources, law and intellectual property. Such URP resources may be helpful to nurturing and accelerating the growth of tenant firms (Phan et al., 2005;

Table 2
Examples of URP that vary in terms of development^a.

Level of URP development services	URP and location	Affiliated universities	Development services offered	Founded	Number of tenant firms (employees)	Related studies
High	Aston Science Park, Birmingham, UK	Aston University	Real estate services, clerical services, business advice and academic support	1982	110 (6000)	Guy (1996)
	Mjardevi Science Park, Linköping, Sweden	Linköping University	Training, incubation, networking, business development, financing, and internationalization services	1984	250 (6100)	Hommen et al. (2006)
	Virginia Tech Science Park, Blacksburg, USA	Virginia Tech	Marketing expertise and management skills through customized project/consulting teams	1983	140 (2200)	Echols and Meredith (1998)
	Ideon Science Park, Lund, Sweden	Lund University and Lund Institute of Technology	Mentoring and advising in matters of leadership, financing, business development, law, patents or accounting	1983	182 (6000)	Park (2002)
Low	Singapore Science Park, Singapore	National University of Singapore (NUS), National University Hospital (NUH)	Real estate services	1980	350 (more than 6000)	Phillips and Yeung (2003)
	Research Triangle Park, North Carolina, USA	Duke University in Durham, North Carolina State University in Raleigh, and the University of North Carolina at Chapel Hill	Real estate and networking opportunities	1959	170 (38,000)	Link and Scott (2003b)
	Stanford Research Park, Palo Alto, USA	Stanford University	Real estate services	1953	150 (23,000)	Sandelin (2004)
	Surrey Research Park, Guildford, Surrey, UK	University of Surrey	Real estate and networking opportunities	1984	115 (2750)	Vedovello (1997)

^a This table provides examples of URPs with high or low development as reported by studies and/or the URP.

Löfsten and Lindelöf, 2001; Koh et al., 2005; Malek et al., 2014). But acquiring and delivering this development capacity requires money and effort invested in activities such as recruitment, staff training, workshops, and a large base of accumulated experience that can support tenant firms. Conversely, low development URPs do not employ such resources and thus do not incur such costs. They focus solely on marketing and managing rental contracts, performing basic building maintenance and collecting the rents at the end of each month (all of which high development URPs also do). However, low development URPs’ tenants may grow on average at slower rates during the time they are associated with the URP (Monck et al., 1988; Dettwiler et al., 2006).

A second fundamental implication of development is the URP’s ability to shape the growth of their tenant firms. High development URPs will likely to be able to influence the tenant firm learning, trajectory and shape their growth in a much more substantial way (Fang et al., 2010). This is because the URP management team will be able to offer whatever services they feel are necessary, in the format they feel the tenant firm needs and at the cost they feel appropriate (Vanderstraeten et al., 2016). Conversely, a low development URP will let tenant firms to search and acquire the needed business services externally (i.e., on the market), independent of their scope, quality or cost.

A third key implication to development is the extent to which the approach adopted by the URP could make tenant firms overly reliant on the URP, and result in firms struggling to survive once they leave the URP. High development URPs can lead to tenants having a strong dependency on the URP’s development services. This increases the chances that tenants become “lost cases” after they graduate from the URP as they may face difficulties in running the business without the URP business services (Hytti and Maki, 2007). URP start-ups historically have been facing higher mortality rates (Criaco et al., 2014), and this might well be one of the implications of high development URPs’ excessive nurturing, spoiling them, and consequently preventing them to undertake a successful trajectory after they graduate.

With these two dimensions taken together, we now articulate in the next section the resulting typology of four types of strategies that URP can (and do) pursue.

2.3. A typology of URP strategies

In Fig. 2, we combine the specialization and development dimensions to produce a typology of four types of URP strategy, which we label *Landlord*, *Matchmaker*, *Coach* and *Gardener*. As specialization and development allow for continuous variation, our “high” and “low” classifications should be seen as simplifications that describe the characteristics of ideal URP strategies. In this section, we summarize the characteristics of each type and identify actual examples of URPs that fit into each type.

The *Landlord* strategy refers to URPs that adopt low specialization and low development strategies. URPs employing this strategy

URP specialization	High	Matchmaker	Gardener
		<ul style="list-style-type: none"> • Focused and efficient use of URP resources, with higher risk of lower demand for URP space. • Greater networking opportunities between tenants. • Tenants are left to “sink or swim”. 	<ul style="list-style-type: none"> • Focused and efficient use of URP resources, with higher risk of lower demand for URP space. • Greater networking opportunities between tenants. • Tenants are supported, nurtured, and more dependent on the URP.
	Low	Landlord	Coach
		<ul style="list-style-type: none"> • Unfocused and less efficient use of URP resources, with lower risk of lower demand for URP space. • Less networking opportunities between tenants. • Tenants are left to “sink or swim”. 	<ul style="list-style-type: none"> • Unfocused and less efficient use of URP resources, with lower risk of low demand for URP space. • Less networking opportunities between tenants. • Tenants are supported, nurtured, and more dependent on the URP.
		Low	High
		URP development services	

Fig. 2. Typology of URP strategies.

host tenants from a broad range of industries. This helps the URP attract a greater number of tenant firms, but entails less focused networking opportunities for them. Furthermore, it is difficult for the URP to efficiently provide access to resources such as industry specific infrastructure and technology. Landlord URPs also provide limited or no development services to tenant firms, avoiding the expense of maintaining development resources (lower operational costs), but then relying on the external environment to provide services tenant firms need (and losing the opportunity to influence on tenant's growth trajectory). This may also imply risking slower tenant firms growth while in the URP, but can potentially generate a more independent tenant firm after graduation. The Stanford Research Park in the U.S. (see Table 1) is an example of the Landlord URP, as it accepts firms from multiple industries and offers basically real estate services to tenant firms.

The *Matchmaker* strategy combines high specialization and low development strategies. This will likely be the least resource diverse URP strategy, as it allows for more efficient investment in specialized infrastructure and foregoes the costs of maintaining development resources. The industry of specialization might be (and actually should be) aligned with the existing internal capabilities of the associated university (i.e., the associated university has expertise and reputation in the industry). Matchmaker URPs can generate a more focused set of networking opportunities to tenant firms within the URP, and more independent tenant firms after they leave the URP. However, it runs the risk of a smaller pool of candidate tenants, along with the risk of slow-downs or collapse of the targeted industry. The BioRio Park in Brazil (see Table 1) is an example of a Matchmaker strategy: due to strong public policy incentives, the URP accepts only firms operating in the biotechnology industry; and only offers associated real estate services and passive networking opportunities to tenants.

The *Coach* strategy refers to URPs that adopt low specialization and high development strategies. This may be the most resource intensive strategy, as the URP seeks to offer real estate infrastructure and development services that are suitable to tenants from a wide range of industries. Thus, it accepts potential inefficiencies in the provision of infrastructure, services and networking opportunities for the benefits of a wide pool of candidates (low risk of low utilization). This strategy is likely to provide the URP with the ability to influence the trajectory and growth of tenant firms, but it can also generate tenant firm dependency on the URP. The Mjardevi Science Park in Sweden (see Table 2) is an example of a URP adopting the Coach strategy. The URP accepts firms from multiple industries such as mobile broadband, imaging and visualization, automotive safety, and software systems, and offers a comprehensive set of in-house business development services, including business training, incubation, networking, business development, book-keeping, financing, and internationalization services.

The *Gardener* strategy adopts high specialization and high development. Gardener URPs have the advantage of offering customized infrastructure and development services efficiently, because of their narrow industry focus. But this comes with the risks of a smaller tenant pool, a downturn in the target industry, and potential under-utilization of development services. This strategic choice might be (and actually should be) aligned with the existing internal capabilities of the associated university (i.e., industry focus and business services expertise). Although this type of URP offers more focused networking opportunities to tenant firms and is likely to retain the ability to influence the trajectory and growth of its firms, at the same time it is likely to generate some sort of dependency on tenant firms after they graduate. The Leiden Bio Science Park (Netherlands) (see Table 1) is an example of a URP adopting the Gardener strategy. The Leiden Bio Science Park accepts firms operating only in medical science industries and offers a comprehensive set of in-house business development services to grow its tenant firms such as assistance for securing funding, financial services, law services, human resources assistance, intellectual property protection, technology transfer support, negotiation of license agreements, and contract negotiation support.

3. Potential determinants of URP strategy variation

In this section we present three determinants for URPs having different levels of specialization and development services: the external environment, the internal capabilities of the affiliated university, and the management capabilities of a URP. This is not a definitive list, but rather some of the key organization-environment related reasons for variance in URP strategies.

The first is that URPs choose strategies to suit different local economic environments. Similar contingency arguments have been applied to business incubators (Hackett and Dilts, 2004; Bruneel et al., 2012). In particular, the level of existing entrepreneurial activity and resources (outside of the university) and the diversity of the local industry/technology base are characteristics in this category that can shape URP choices on specialization and development. For instance, in a region that already possesses high levels of entrepreneurial activity and the actors necessary for new venture formation and growth (investors, IP lawyers, mentors, suppliers, etc.), URP tenant firms will have less need for URP development services (Etzkowitz, 1995, Nelson, 1993). Conversely, we also predict that when URPs are located in environments with few resources for entrepreneurial support, then development services may be valuable and even essential to tenant growth and survival. This approach is apparent in the contrast between URPs at MIT, where the region is rich in innovation support, and those at Yale University, where the URP must offer resources to compensate for the lack of rich business support ecosystem in the region (Breznitz et al., 2008).

As noted in our earlier discussion, the viability of a high specialization URP strategy hinges on the existence of a suitable number of potential tenants in the area of specialization (i.e., how dynamic the focus industry is in the region). Thus, the current and desired industry composition and dynamics in a local economy will shape a URP's specialization choice. For example, a region that features substantial innovative and commercial activity within a given industry will make a specialization strategy more likely to succeed than a region with a diverse set of industries without proper depth in any particular industry.

The second determinant for URPs having different strategies is due to variances in the internal capabilities, mission and objectives of the affiliated university. For instance, universities vary in their commitment to and activities for serving and supporting economic development in their region. Differences in URP specialization may stem from variances in the local versus global orientation of the

university. Universities with a strong commitment to their local communities may want the URP to focus on local employment and job creation within the regional areas of expertise. Also, some universities may have a reputation and focus on one specific industry while others are positioned as having more generalist approaches. These university characteristics, alone or in conjunction with the university mission and objectives, can translate to different priorities for the URPs (Clarysse et al., 2005; Feldman and Desrochers, 2003, Khan et al., 2010), and consequently different specialization approaches.

Internal factors of the affiliated universities might also affect the level of development effort put forward by the URP. For example, if the university possesses the business capabilities to support the URP's tenants, then an inclination for a high development might happen, otherwise a low development route might be preferable. Also, differences in development services may stem from differences in whether a university views its URP as a not-for-profit public good or as a for-profit venture (O'Shea et al., 2005). In the former case, the university may be more likely to encourage the URP to adopt a high development strategy (i.e., more nurturing and supporting) while in the latter case a low development route might be preferable (i.e., picking the winners).

The third determinant for URP strategy variation is differences in the existing capabilities internal to the URP, especially the characteristics of its managers (or management teams) and their past professional experience. A URP manager's prior experience – in terms of specific industries, entrepreneurial endeavors, business services, economic development, and real estate project management – will affect the set of capabilities and preferences they bring to a URP. The literature on university-industry relationship recognizes this link. For example, Siegel et al. (2004) propose that university technology transfer managers with marketing and negotiation experience tend to be more successful in connecting to the industry, while Grigg (1994) suggests that URP success is dependent on a strong and dynamic leader. Therefore, as URP managers are often responsible for developing and implementing URP strategies, it is reasonable to assume that these capabilities and preferences may also influence a URP's choices of specialization. For example, URP managers with extensive experience in a specific industry may find it easier and more rewarding to run URPs focused on that industry, both because of their specific industry knowledge as well as their existing social network. By contrast, URP managers with general business experience in multiple industries and/or policy positions might be more inclined to act as a gatekeeper for different industry groups, and therefore, choose low specialization. In addition to manager's experience, anchor tenants may also play an important role in the URP specialization strategy.

A URP manager's prior experience may also affect the preferences they have for a URP's development approach. For example, a URP manager (or management teams) with primarily real estate development and basic management background will be more inclined to pursue a low development approach. On the other hand, a URP manager with experience in business development, entrepreneurial finance, or other business building activities may have the capabilities, preferences, and established network to feel more comfortable pursuing a high development strategy. This focus on URP manager experience as a source of variation is consistent with the analysis of Von Zedtwitz and Grimaldi (2006), who propose a typology for incubators based on the motives and capabilities of their leaders. Similar to specialization, anchor tenants may also play an important role in the URP development strategy as synergies and specific interests might exist for anchor tenants to offer development support to promising start-ups.

4. URP strategic fit

In this section we follow similar research on incubators that calls for theoretical explanations to questions such as: Are some strategies better than others in achieving certain goals? And, how does alignment of the strategic dimensions influence performance? (Bergek and Norrman, 2008). To do this, we draw upon the strategic fit literature, which asserts that the degree of fit (or consistency or alignment) between an organization's resources and capabilities, its strategy, and the characteristics of the external environment will influence the organization's performance (Doty et al., 1993, Venkatraman and Camillus, 1984, Miller, 1992). Strategic fit is often broken down into internal fit, which refers to the alignment between an organization's resources/capabilities and its strategy (Chandler, 1962; Porter, 1996); and external fit, which refers to the alignment between an organization's strategy and the conditions of its external environment (Lawrence and Lorsch, 1967; Miller, 1992).

URP internal fit relates to the alignment between the URP's resources, capabilities and its strategy. High internal fit occurs, for instance, when a URP manager who possesses industry-specific experience together with an affiliated university that possesses industry-specific resources and capabilities are then matched to a high specialization URP strategy (Matchmaker and Gardener). Hence, their technological knowledge, available resources and specific industry management experience will provide advantages in understanding which tenants to select and what type of support they require (Bell and Pavitt, 1995; Brusoni et al., 2001). Similarly, when the URP manager who possesses experience in multiple industries along with an affiliated university that possesses a more generalist set of resources and capabilities are then matched with a low specialization URP (Landlord and Coach), this then would provide high internal fit. This way, URP managers are able to effectively work with, understand, and provide services to the tenant firms from different industries. Conversely, low internal fit is when there is a mismatch between the available capabilities (e.g., managers' experience, universities' resources and capabilities) and the URP's specialization strategy.

With regards to development, high internal fit occurs, for example, when a URP manager who has the relevant start-up building expertise and the affiliated university that has the resources and capabilities needed to support the development of the tenant firms are then matched with a high development URP strategy (Coach and Gardener). The URP manager is actually experienced at helping firms through their different life cycle stages (Jawahar and McLaughlin, 2001; Vohora et al., 2004) and the affiliated university possesses related resources and capabilities. Conversely, if a URP manager does not possess such experience and an affiliated university does not have such business development resources and capabilities, then low development strategies (Landlord and Matchmaker) is likely to be a better fit. Similarly, to specialization, low internal fit will happen when there is a mismatch between the available capabilities (e.g., managers' experience, universities' resources and capabilities) and the URP's development strategy.

Table 3
Factors associated with URP strategic fit.

URP strategy	University mission, objectives, resources and capabilities					URP management team capabilities			URP regional environment		
	Industry-specific capabilities	Start-up building capabilities	Local	Global	For-profit	Not-for-profit	Industry-specific experience	General business experience	Business development experience	Robust business development ecosystem	Focused industry-specific base
Matchmaker	X			X	X		X			X	X
Gardner	X	X		X		X	X		X		X
Landlord			X		X			X		X	
Coach		X	X			X			X		

URP external fit is the extent to which a URP's strategy fits with its environmental conditions. Thus, for instance, high external fit occurs when a high specialization URP strategy (Matchmaker and Gardener) is deployed in environments that include a focused industry/technology base in the industry of specialization (i.e., existing industry knowledge, trained labour force, presence of focused high education institutions and research institutes). This way, the URP will focus on an industry where tenant firms can encounter plenty of industry-related resources and capabilities available in the local/regional environment. Similarly, high external fit will also occur when a URP adopts low specialization strategies (Landlord and Coach) in regions where there is a balanced mix of industry sectors, without a clear dominance of any industry.

In regards to development, a URP with a low development strategy (Landlord and Matchmaker) located in a robust business development ecosystem will exhibit high external fit. This way, the tenant firms can encounter plenty of available business-related resources and capabilities in the local/regional environment (e.g., high level of entrepreneurial dynamism with the presence of consulting firms, active business associations, large pool of business-trained labour, training opportunities and financing institutions). In such a case, a URP does not need to offer a wide range of development services to its tenant firms as they will be able to receive these services from their local environment within the desired scope, quality and cost levels. Similarly, high external fit refers to a URP choosing high development strategy (Coach and Gardener) in local environments with weak business development ecosystems. In this case, since the local environment is not conducive to entrepreneurship and business start-up development (i.e., it does not offer business development resources and capabilities locally), then the URP will need to provide these very much needed services to its tenants. Using this logic, we posit how each type of URP strategy would produce strategic fit (see Table 3 for a summary):

- Matchmaker URP (high-specialization & low-development strategy) – high strategic fit is achieved when a URP: (i) is affiliated with a university that possesses the needed resources and capabilities associated with the industry of specialization, has a global orientation (i.e., international reach and reputation) and views the URP as a for-profit venture, (ii) has a manager or a management team with extensive experience in the industry in which the URP specializes, and (iii) is located in a region with a focused industry/technology base in the industry in which the URP specializes and a robust business development ecosystem.
- Gardner URP (high-specialization & high-development strategy) – high strategic fit is achieved when a URP: (i) is affiliated with a university that possesses the needed resources and capabilities associated with start-up building in the industry of specialization, has a global orientation (i.e., international reach and reputation) and views the URP as a public good, (ii) has a manager or a management team with experience in supporting new ventures and start-ups in the industry in which the URP specializes, and (iii) exists in a local economic environment with a focused industry/technology base in the industry in which the URP specializes and a weak business development ecosystem.
- Landlord URP (low-specialization & low-development strategy) – high strategic fit is achieved when a URP: (i) is affiliated with a generalist university in terms of its resources and capabilities, has a local orientation (i.e., local/regional reach and development) and views the URP as a for-profit venture, (ii) has a manager or a management team with experience in a variety of industries, particularly managing commercial/industrial real estate, and (iii) exists in a local economic environment with broad industry/technology base and a robust business development ecosystem.
- Coach URP (low-specialization & high-development strategy) – high strategic fit is achieved when a URP: (i) is affiliated with a generalist university that possesses resources and capabilities associated with start-up building in multiple industries, has a local orientation (i.e., local/regional reach and development) and views the URP as a public good, (ii) has a manager or a management team with experience running or supporting new ventures and start-ups in a variety of industries, and (iii) exists in a local economic environment with a broad industry/technology base and a weak business development ecosystem.

5. Discussion

While URPs are considered to be an important and growing phenomenon for supporting new venture development, technology transfer and economic development, studies on URP impact have been hampered by abstractions that ignore or suppress how URPs vary in terms of their strategies. In response, we presented a typology and associated theorizing and predictions to explore (i) the variations in URP strategies; (ii) potential explanations for the variance of URP strategies; and, (3) insights on how URPs can achieve internal and external strategic fit. We now discuss the implications of this work for future research and practice concerned with

creating and managing URPs.

5.1. One size does not fit all

Our characterization and illustration of URP strategies shows that URPs can vary significantly in terms of why they exist and what they aim to do. Therefore, we argue that when it comes to URP strategic management, “one size does not fit all.” Variations in the two dimensions – specialization and development – determine the URP’s strategy, its modus operandi, and its needed capabilities; and offer important implications for studying and managing URPs. For example, by combining the two dimensions to produce a typology of four types of URP strategies (Landlord, Matchmaker, Coach and Gardener), it is possible to link these variations to different URP outcomes. This allows researchers, policy-makers and URP managers to gain a clearer understanding of how these dimensions work together to influence the value and the impact a URP has to its different stakeholders.

Thus, while our typology of URP strategies is the first that we know of, it is more than just a classification. It provides an orthogonal framework that satisfies the three aims of theory development: description, explanation, and prediction (Kerlinger and Lee, 1999). It also meets the criteria for a typological theory of organizations (Doty and Glick, 1994) as it explicitly defines constructs that are amenable to measurement and which interact with each other to produce important and interesting outcomes. The core promise of the dimensions and strategies in our typology is that they provide a theoretical basis to help resolve the debate around URP effectiveness. They can help determine which combinations of URP strategies, resources/capabilities, missions, and environments are likely to drive innovation and entrepreneurship—and which are likely to be fruitless ‘high tech fantasises’.

Furthermore, while our dimensions are appropriate in that they are theoretically grounded and can be used to understand URP diversity on their strategies, each one can be unpacked to offer interesting insightful explanation. Specialization for example, is clearly multidimensional. While we define this construct in terms of industry focus, specialization could also be based on criteria such as picking winners by choosing tenants that are perceived to be on track for success based on their technology content, entrepreneurial profile, acquired funds, etc.

5.2. Does the source of the URP strategy variation matter?

In addressing why URPs have such differences, we present three potential explanations: the URP strategy reflects the experience of the URP manager/management team and the capabilities internal to the URP itself; the URP strategy serves the capabilities, mission and objectives of the affiliated university; and the URP strategy echoes the needs and characteristics of its region. These answers vary in terms of whether the source of variation is endogenous or exogenous. Endogenous variation is internal to the URP (i.e., associated with the URP manager/management team), while exogenous variation is external (i.e., the genesis of the strategy originates beyond the URP). This raises interesting questions about how sources of the variation might impact the effectiveness, durability and diffusion of different URP strategies. For example, the literature says that a given strategy might unevenly benefit different stakeholder groups (i.e., an unbalanced outcome), meaning that for some a given strategy will have more effectiveness than for others (Rowley and Moldoveanu, 2003). Also, it is known that when a strategy is in response to the needs of an important stakeholder group(s) that strategy is likely to last longer and be more rapidly and efficiently copied in similar stakeholder situations (Tolbert and Zucker, 1983). Therefore, the source of URP strategy variation is very likely to matter significantly for aspects such as strategy effectiveness, stakeholder management and related outcomes, how long a strategy will last and how quickly/efficiently it will get copied and diffused.

5.3. What influences URP success and change?

In addressing the above question we assumed that ‘it depends’. Thus, we drew upon the contingency theory of organizations to offer a clearer understanding of how a URP must maintain strategic fit, both internally among URP strategy and the resources/capabilities available to URP, and externally between a URP strategy and its environment. Our explanations to these two forms of fit allow researchers, university leaders, policy-makers and URP managers to better define, predict and manage causes of URP success. For example, in terms of partial fit, researchers could examine which is more important to URP performance: high external fit and low internal fit, or low external fit and high internal fit. This would help determine how URPs should plan for, measure and communicate performance progress and evolution. Furthermore, researchers could develop studies to examine the performance implications associated with the sequence in which a fit is attained. That is, in terms of URP performance, is it better to develop a URP strategy first and then employ a suitable and competent URP manager for that strategy, or is it better to recruit a competent URP manager and allow a strategy to emerge based on the capabilities, interests and preferences of that manager?

Another implication from our conceptual model is that it offers a basis to extend the theory through studying the changes that occur on URP strategies over time (e.g., shifting from Landlord to Coach strategy). Fundamental questions such as why and how URPs change their strategy could be examined. Our typology is particularly useful for identifying the drivers and studying such changes for a couple of reasons. First, it portrays the different configurations of strategic dimensions that determine internal URP fit or external URP fit, and these can explain why URPs need to change their strategies. Second, it provides a framework by which researchers can measure the extent to which misfits (internal or external) drive change from one URP strategy to another. For example, research on the related phenomenon of business incubators has identified that the diffusion and adaptation of the incubator strategies occurs as incubators strive to maintain a fit with their changing local needs and conditions (Kuratko and LaFollette, 1987). This relationship between changes in environmental conditions and strategy could be examined empirically for URPs to plot the paths (or trajectories)

of strategic change, the actions that drove the change and the implications for URP's internal resources and capabilities.

6. Conclusion

Even though significant empirical research attention has been given to the rise of URPs, the findings about their impact remain uncertain. We help address this problem by positing that URP strategies are heterogeneous and understanding their variance is essential for determining appropriate strategic fit. In response, we presented a typology of four URP strategies – Landlord, Matchmaker, Coach and Gardener – to help better understand how URPs vary, why they vary, and the appropriate practices associated with their strategy choices. Our typology is both a classification and theoretical mechanism, in that it can be used to describe, explain and predict the effects of URP diversity. We urge researchers to specify the strategy of the URP they are studying to improve the focus of their studies, conceptually and methodologically, and to better account for the causal effects between the URP's available resources and capabilities, the devised strategy, its local environment and the performance outcomes of their specific population of URPs.

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