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INTERORGANISATIONAL KNOWLEDGE FLOWS BETWEEN AND INNOVATIVE PERFORMANCE OF SCIENCE PARK FIRMS: AN EXPLORATORY STUDY OF SOUTH AFRICAN NEW TECHNOLOGY-BASED FIRMS

by

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Declaration

I declare that the thesis, which I hereby submit for the degree Philosophiae Doctor (Technology Management) at the University of Pretoria, is my own work and has not been previously submitted by me for a degree at another University.

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Kai-Ying Alice Chan

Summary

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by

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The establishment of science parks is an important way of connecting technological innovation and economic development and such initiatives have shown success in many developed countries (for example, the Silicon Valley in the USA). In this research, science parks are regarded as spatially bounded infrastructures for facilitating and promoting knowledge flows between knowledge-intensive small and medium-sized technology-based firms. Policy makers in emerging economies, such as South Africa, have placed the development of science parks on their national system of innovation agendas.

Research problem and main question

The fast growth of science parks around the world has inspired many researchers to investigate the function and performance of science parks (SPs). Interestingly, mixed findings are reported on science park performance in the literature: some researchers found that SPs have benefits for the firms located on site; whereas other researchers doubt the benefits that SPs are claimed to have. This thesis aims to explain these mixed findings and proposes a relational approach to study the general view of interorganisational knowledge flows. The main research question to be answered is:

How can the mixed findings of previous research studies regarding innovative performances of science park firms be explained?

To answer the above over-arching research question, four subquestions were formulated and addressed in the Chapters 2 to 5:

- Chapter 2 answers the theoretical subquestion: *Which theoretical explanations can be given for the mixed findings regarding the performance of science park firms?*
- Chapter 3 answers empirical subquestion 1: *Which knowledge exchange behaviours do science park firms show?*
- Chapter 4 answers empirical subquestion 2: *If science park firms behave differently with regard to knowledge exchange, do these differences matter for the firms' performance?*
- Chapter 5 answers empirical subquestion 3: *How can the mixed findings be explained from an empirical point of view?*

Methodology

The Gauteng region in South Africa was chosen because it has the most innovative activities in the country. Moreover, the first internationally recognised science park, namely The Innovation Hub, is located in this region. The unit of analysis is at the firm level. A sample of 52 new technology-based firms (NTBFs) was interviewed by means of structured questionnaires. Twenty-four of them were NTBFs situated in The Innovation Hub and 28 were independent NTBFs not located on a science park, but still in the Gauteng region. The collected data were analysed by applying multivariate analytical techniques.

Main findings

The theoretical explanation of the mixed findings was proposed in Chapter 2. It was argued that:

The positive relationship between intended knowledge flows and innovative performance of firms will be negatively moderated by higher levels of unintended knowledge flows. This moderating effect is stronger for on-park firms than for off-park firms, due to the close geographical distance.

Although this theoretical explanation was not empirically confirmed in Chapter 5, it was found that there is some evidence that, for this set of South African firms, science park location (a geographical dimension) matters when one looks at the multi-dimensional aspects of innovative performance. Moreover, three empirical studies further explore the theoretical framework developed in Chapter 2 to address three topics: *knowledge exchange behaviours* (Chapter 3), *knowledge transfer effectiveness* (Chapter 4) and *knowledge transfers and innovative performances* (Chapter 5).

The study presented in Chapter 2 found the existence of two groups of firms located in The Innovation Hub (denoted as on-park firms): one group of on-park firms only interact with firms located outside the park (off-park firms); and one

group of firms interact with both other on-park firms and off-park firms. In other words, not all on-park firms are involved in knowledge transfer activities between one another. Some of them may be situated on the park only for the sake of their reputation. Chapters 4 and 5 reported several factors that matter for knowledge transfer effectiveness and innovative performance. To enhance knowledge transfer effectiveness two factors are of importance, namely frequency of knowledge transfer and technological similarity. For a firm to improve on its new innovative sales, two configurations of knowledge flows should be encouraged: intended knowledge inflows via informal network ties; and unintended knowledge inflows via informal and/or social network ties.

Despite the fact that this research did not empirically confirm the theoretical explanation of the mixed findings found in science park literature, some issues raised in the recommendation section of this thesis could account for the mixed findings, namely differences in the scanning processes of new entrant firms, the nature of networking activities, services provided by SP management teams, academic-industry links and configurations of knowledge flows. The findings and recommendations of this study may help policy makers to further improve the design and functioning of science parks in emerging economies.

Keywords

Science parks, NTBFs, interorganisational knowledge flows, innovative outcomes, emerging economies, regional system of innovation, South Africa.

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