

## **GUIDING DIAGRAM**



	ionships" e paper are shown below: -	Chapter 3: an empirical chapter "Knowledge exchange behaviours
	Formal ties	of science park firms: The
Direct ties	Informal ties	Innovation Hub case"
	Social ties	
<b>-</b>	Organizational trust	
Trust	Personal trust	
	Geographical proximity	
Proximities	Technological proximity	Chapter 4: an empirical chapter "A relational view of knowledge
	Organizational proximity	transfer effectiveness in small ne technology- based firms: An empirical view from South Africa"
Kaanila data ay siliku	Knowledge usability DV	
Knowledge quality	Frequency of transfer	H
Diversit	y of actors	
Unintended I	knowledge flows	
Absorpti	ve capacity	Chapter 5: an empirical chapter "Knowledge transfers between ar
	performance DV	innovative performances of NTBF

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# Evaluation of SCIENCE PARKS in literature WITH THE FOCUS ON A COMPARISON BETWEEN ON- AND OFF-PARK FIRMS



			Researc	h methodology	
Author(s)	Country and period	Research focus	Sampling approach	Data collection and analysis techniques	Key results
Felsenstein (1994)	Israel (period of study not known)	To examine the role of science parks as "seedbeds" of innovation by looking at the effects of seedbed (as indicated by level of interaction with a local university and the entrepreneur's educational background) on a firm's innovation level	stratified sampling On-park: 72 Off-park: 90	Questionnaire survey at firm level Log-linear modelling	(1) The level of interaction between on-park firms and local universities is generally low, however, it is higher than the level of interaction exhibited by off-park firms; (2) Seedbed effects are not necessarily related to a firm's innovative level; (3) Science park location has only a weak and indirect relationship with innovation level
Westhead and Cowling (1995)	UK (1986-992)	<ul> <li>To assess the employment growth in the "surviving" firms located on- and off-park</li> <li>To identify factors that are associated with employment growth</li> </ul>	Matched sampling On-park: 49 Off-park: 44	Questionnaire survey at firm level Longitudinal data set (1986-1992) Bivariate and multiple correlation and regression	No difference in the employment growth of on- and off-park firms; (2) Education and technical experience and financial sources are associated with employment growth
Westhead (1997)	UK (1986-1992)	To assess the R&D inputs and outputs between firms located on- and off-park	Matched sampling On-park: 41 Off-park: 40	Questionnaire survey at firm level Chi-square test	<ul> <li>No significance differences in the R&amp;D inputs (R&amp;D expenditure and percentage of qualified scientists and engineers) of on-and off-park firms</li> <li>No significance differences in the R&amp;D outputs (patents, copyrights, new products/services) between on- and off-park firms</li> </ul>



			Researc	h methodology	
Author(s)	Country and period	Research focus	Sampling approach	Data collection and analysis techniques	Key results
Löfsten and Lindelöf (2002)	Sweden (1996-1998)	To assess the performance (sales, employment and profitability) of firms located on- and off-park	Matched sampling On-park: 134 Off-park: 139	Questionnaire survey at firm level Chi-square test, Independent t-test	<ul> <li>On-park firms cooperate more with universities</li> <li>On-park firms have higher employment and sales growth</li> <li>No significant difference in the profitability of on- and off-park firms</li> </ul>
Colombo and Delmastro (2002)	Italy (2000)	To determine if SPs are successful in fostering the establishment and growth of NTBFs by comparing on- and off-park firms in terms of: • Characteristics of founder • Growth and innovativeness of firms • Access to public subsidies	Matched sampling On-park: 45 Off-park: 45	Questionnaire survey at firm level Chi-square test, Independent t-test	<ul> <li>On-park founders are mainly motivated by innovation-related factors</li> <li>No differences in the innovative inputs</li> <li>No difference in the innovative outcomes (patents)</li> <li>On-park firms have higher employee growth and easier access to public subsidies</li> </ul>
Siegel, Westhead and Wright (2003)	UK (1986-1992)	To study the impact of SP on research productivity by comparing on- and off-park firms	Matched sampling On-park: 89 Off-park: 88	Questionnaire survey at firm level Independent t-test	<ul> <li>For two of the three R&amp;D outputs measured (new products and patents), the output elasticity is positive and statistically significant for on-park firms</li> <li>On-park firms have slightly higher research productivity</li> </ul>



			Researc	h methodology	
Author(s)	Country and period	Research focus	Sampling approach	Data collection and analysis techniques	Key results
Lindelöf and Löfsten (2003)	Sweden (1996-1998)	To assess the performance of SP by comparing on- and off-park firms in their strategic approaches	Matched sampling On-park: 134 Off-park: 139	Questionnaire survey at firm level Independent t-test	<ul> <li>On-park firms showed significantly greater emphasis on firm characteristics such as innovation ability, competitor- and market- orientation, sales and employment growth, high profits, etc.</li> <li>Off-park firms reported proximity to other firms to be of higher importance than the on-park sample in their choice of location</li> <li>No significant difference in new products (before competitors) and patents</li> </ul>
Lindelöf and Löfsten (2004)	Sweden (1996-1998)	To examine the level of interactions with local universities during innovation process	Matched sampling On-park: 134 Off-park: 139	Questionnaire survey at firm level Independent t-test, correlation, factor analysis	<ul> <li>On-park firms have higher technological innovation (product development) than off-park firms</li> <li>Off-park firms have higher R&amp;D outputs (patents)</li> <li>On-park firms have low level of interactions with universities, but it is still higher than off-park firms</li> </ul>



			Researc	h methodology	
Author(s)	Country and period	Research focus	Sampling approach	Data collection and analysis techniques	Key results
Ferguson and Olofsson (2004)	Sweden (1991-2000)	To investigate the survival and growth of NTBFs located on and off two Swedish science parks	Stratified sampling Total on- and off-park firms: 66	Questionnaire survey at firm-level Longitudinal data set (1991-2000) Correlations	<ul> <li>On-park firms have a higher survival rate than off-park firms</li> <li>No differences in the sales of on- and off-park firms</li> <li>No differences in the employment growth of on- and off-park firms</li> <li>On-park firms reported higher image benefits and benefits in cooperation with universities</li> </ul>
Akçomak and Taymaz (2004)	Turkey (2000-2002)	To assess the effectiveness of incubators in Turkey	Matched sampling On-park: 48 Off-park: 41	Questionnaire survey at firm level Chi-square test, Independent t-test	<ul> <li>On-park firms have higher economic performance (employment growth) than offpark firms</li> <li>No differences in the innovative output (new product/service development) of onand off-park firms</li> <li>On-park firms give more importance to interaction with universities as opposed to their off-park counterparts</li> </ul>



			Researc	h methodology	
Author(s)	Country and period	Research focus	Sampling approach	Data collection and analysis techniques	Key results
Dettwiler, Lindelöf and Löfsten (2006)	Sweden (1999)	To relate location to facilities management and how it can affect the growth and performance of NTBFs.	Stratified sampling On-park: 134 Off-park: 139	Questionnaire survey at firm-level Descriptive analysis	<ul> <li>On-park firms rank proximity to university to be important as compared with off-park firms</li> <li>Facilities management indirectly contributes to interactions, inter-firm relations and networks in on-park firms</li> </ul>
Malairaja and Zawdie (2008)	Malaysia (period of study unknown)	To examine the effectiveness of science parks as a strategy to promote university-industry collaboration	Matched sampling On-park: 101 Off-park: unknown	Questionnaire survey at firm-level Chi-square test, Independent t- test	On-park firms have (not at statistically significant level) more links with universities than off-park firms
Yang et al. (2009)	Taiwan (1998-2003)	To compare the R&D productivity of NTBFs located within and outside of science parks by measuring the elasticity of R&D with respect to output	Matched sampling On-park: 57 Off-park: 190	Panel data from databank of the Taiwan Economic Journal & Taiwan Intellectual Property Office Independent t- test, regression analysis	On-park firms have significantly higher R&D spending, R&D intensity and patents than off- park firms On-park firms have higher elasticity of R&D with respect to outputs (as the indicator of R&D productivity) than off-park firms, i.e. on- park firms invest more efficiently in innovations



## References

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## **QUESTIOINNAIRE FOR ON-PARK FIRMS**

#### Impacts of networks

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nnology-based firms		
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	GENERAL INF				
A. Contact information	I	Please provid	le an answer where applicable		
Name of your firm:					
Name of parent and/or daughter firm:       Parent firm:       Daughter firm(s):         Name of contact person in your firm:       Daughter firm(s):       Daughter firm(s):         Contact telephone number:       Email address:       Prease tick only one answer, or provide an answer where applicable         B. Type of firm and main activities       Please tick only one answer, or provide an answer where applicable       A manufacturing firm         B.1 Your firm is:       Please tick only one answer, or provide an answer where applicable       A manufacturing firm         or answering this question, use as the percentage of sales was realised in 2007.       Please tick (can be more than one answer) or provide an answer where applicable         B.2 What is the main activity of your firm?       Please tick (can be more than one answer) or provide an answer where applicable         B.2 What is the main activity of your firm?       Please tick (can be more than one answer) or provide an answer where applicable         B.2 What is the main activity of your firm?       Please tick (can be more than one answer) or provide an answer where applicable         B.2 What is the main activity of your firm?       Please tick (can be more than one answer) or provide an answer where applicable         B.2 What is the main activity of your firm?       Please tick (can be more than one answer) or provide an answer where applicable         B.2 What is the main activity of your firm?       Production of product parts and components         Devel					
	Daughter firm(s	):			
Name of contact person in your firm:					
Contact telephone number:					
Email address:					
B. Type of firm and main activities	I				
When answering this question, use as the criterion the activity in which the highest	□ A manufa □ A service	cturing firm provider	where applicable		
<b>B.2</b> What is the main activity of your firm?	applicable Production Developme Production Production Production Developme Production Developme Production Developme Financial s Business se	a of consumer goods ent of consumer goods a of raw and refined materials ent of raw and refined materials a of product parts and components ent of product equipment ent of product equipment (services) eation (services) ervices ervices (engineering, IT)			
C. Firm ago and size		Please provid	le an answer where applicable		
			and the intere appreciate		
In which year did your firm locate to The Innovat	ion Hub?				
in which year the your min locate to the innovat		1 car.			
Have you participated in the Maxum Bust programme?	iness Incubator	<ul> <li>Yes, I am currently joini</li> <li>Yes, I have graduated from the provided of the provided of</li></ul>	om the programme		
Total number of employees (including directo your firm in 2005 (if applicable) and 2007?	rs/managers) in	2005	2007		
Total sales (if any) of your firm in 2005 (if applic. (if sales volume is 1 million, please write 1,000,00		2005 R	2007 R		

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D. 8	Services provided by your science pa	SITY OF	PRETOR		Ple	ase tick wl	here appro	opriate
	what extent are you satisfied with the following services prov r science park?	ided by	Do not use the service	ti	vou use the he level of lly dissatis <b>2</b>	satisfaction	n on a sca	le of
1.	Overall impression on pleasant environment (e.g. of site sec	urity, car						
	parking with space for visitors, self-contained and lockable	units with		1				
	power and heating, possibility to expand into additional/adja	acent units)		1				
2.	Sharing office equipment, administrative support (e.g. meet	ing rooms,						
	library, reception area)			1				
3.	Organising marketing events, exhibitions, press conferences	5						
4.	Provision of legal (by Adams & Adams), accounting, busine	ess,						
	technical advice at low cost (or free of charge)			1 1 1				
5.	Well-established image due to location on the science park							
6.	Access to partnership opportunities with other technology fi	rms						
	located on the science park, knowledge sharing/dissemination	on		1				
7.	Development of a pool of skilled labour, benefits from logis	tic						
	arrangements, benefits from support network (e.g. emergene	ce of		1				
	complementary industries)			1 1 1				
8.	Access to market, research centres, universities							
9.	Rental subsidies, subsidies on telecom/computer network ac	cess, other						
	subsidies related to cost reduction (only in Maxum)			!				
10.	Access to venture capital funding, banking facilities, other s	ources of						
	funding							
	INNOVATIV							
1. I	nnovated product/services	Ple	ase tick w	here app	propriate: a	only one ar	nswer is p	ossible
and	ween 2005 and 2007, has your firm introduced <b>products</b> /or <b>services</b> onto the market that were technologically <b>proved</b> or <b>new</b> to your firm?	□ Yes, pr	oducts/ser	vices de	veloped m	ainly <b>by a</b>	third par	·ty
Imt	<b>roved:</b> an existing product/service which has clearly	□ Yes, pr	oducts/ser	vices de	veloped to	gether wit!	h a third	party
imp	roved technical specifications or increased usability apared to a previous version	□ Yes, p	roducts/se	rvices de	eveloped m	nainly <b>by r</b>	ny own fi	rm
or s	<b>v:</b> a product/service incomparable with previous products ervices of your firm and in which new technology is podied	□ No. Pl	ease go to	Questio	on 4			
2. P	roduct and/or service innovation and sales		Pleas	e tick or	· provide a	n answer v	where app	licable

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		I I I I I I I I I I I I I I I I I I I	II III
А.	How many patents did your firm file in 2005 (if applicable) and 2007 respectively?	2005	2007
В.	How many new products and/or services did your firm develop in 2005 (if applicable) and 2007 but did not yet introduce to the market in 2005 and 2007 respectively?	2005	2007
C.	Do you have products and/or services on the market in 2007?	□ Yes. Please contin □ No. Please go to <b>Q</b>	-
D.	For 2007, give an indication of the distribution of sales of products and/or services of your firm that: Did not change Were technologically improved Were technologically new	Distribution of total % %	Total has to add up to 100%
E.	In 2007, did your firm sell products/services that were not only technologically new or improved for your firm, but <b>also</b> technologically new or improved in the <b>market</b> ? ( <i>i.e. your competitors had not already introduced such products/services</i> )	□ Yes → Share of products approxin □ No	s/services in 2007 was

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	results of product/service inno	ESITHI YA PR	ETOR			ase tick w		opriate
	ndicate to what extent your firm's product and/or nnovations in 2007 resulted in:			the extent o le / not muo <b>3</b>	<u>ch) to 5</u>			
А.	Reduction of development and maintenance costs							
В.	Quality improvement of products and/or services							
C.	Increases in production capacity							
D.	Improvement in delivery times							
Е.	Increase in sales							
F.	Increase in profits							
4. Innov	rated processes	Please	tick wh	ere approp	oriate: o	only one a	nswer is p	oossibl
Between	2005 and 2007, did your firm bring production							
processe	into use that were technologically <b>improved</b> or your firm?	□ Yes, process	es deve	loped main	ly <b>by a</b>	third pa	rty	
	<i>d:</i> an existing production process, but with clearly erformance, less cost or improved production	$\Box$ Yes, process	es deve	loped toget	her wit	h a third	party	
reliabilit		□ Yes, process	es deve	loped main	ly <b>by n</b>	ny own fi	rm	
	process incomparable with previous processes of n and in which new technology is embodied	□ No. Please c	continue	e with Que	stion 6			
5. Other	results of process innovations				Plea	ase tick w	here appr	opriat
	idicate to what extent your firm's process ons in 2007 resulted in:		ot little	the extent of and not m				
		1	2	3		4	5	
А.	Reduction of development and maintenance costs							
В.	Quality improvement of products and/or services							
C.	Increases in production capacity							
D.	Improvement in delivery times							
Е.	Increase in sales							
F.	Increase in profits							
6. Firm'	's level of knowledge and experience				Plea	ase tick w	here appr	•opriat
To what	extent do the following statements apply to your firm	?		1 (strong	ly disag	dicate on gree), 3 (n o 5 (stron	either agi	ree nor
A.	Most of the staff in our firm is highly skilled and qua	alified		<b>1</b>	<b>2</b> □	<b>3</b> □	<b>4</b> □	5 □
B.	Our firm invests substantially in training							
C.	Our firm innovates by improving other firms' produ	cts and processes						
D.	Most of the time our firm is ahead of our competitor launching new products	s in developing and	d					
E.	Our firm has the ability to adapt other firms' technol	logies						
F.	Our firm innovates as the result of R&D carried out	within our own fir	m					
G.	Our firm has considerable resources and own knowl technological development	egde resources for						
H.	Our firm is able to introduce into the market innovat	tions that are						
	completely novel on a worldwide scale							

		4								
7. Trust 7.1 Interorganisatio	nal trust		VERSITEIT VAN IVERSITY OF P NIBESITHI YA I	PRETO PRETO PRETO	RIA RIA		Please	tick wh	ere app	ropriate
To what extent do the	e following sta	atements apply to your which my firm <b>excha</b>				te on a s ree nor c	scale of	1 (stron	gly dise	agree),
	ses they make		inges into treage.	1 □	2 □	3	<b>4</b>	5	6 □	<b>7</b>
	honest with us									
<b>C.</b> provide info	ormation that	we can believe								
<b>D.</b> are genuine	ly concerned	that our business shoul	ld succeed							
E. consider ou decisions	ır welfare as v	vell as their own when	making important							
<b>F.</b> keep our be	est interests in	mind								
G. are trustwo	rthy									
<b>H.</b> it is not nec	essary to be c	autious in dealing with	n them							
7.2 Interpersonal tr	ust						Please			
		atements apply to your n my firm exchanges k				te on a s ree nor d				
			-	1	2	3	4	5	6	7
-	-	ial in negotiations with	ıus							
-		n to act as we expect								
<b>C.</b> are trustwo	rthy									
		en when it is costly to c								
E. if their perf sense of be		e below our expectation	ns, we would feel a							
8. Relationship with	firms on you	ır science park								
Does your firm excha knowledge with firms/organisations lo your science park?	-		tinue with Question		-			-	ns	
<b>·</b> 1			o Question 13 and c	_					FID	
NETWORK 9. Degree centrality	ING FOR	R INTENDED K	NOWLEDGE	FLOV	vs w	/ITH (	ON-P. Please			
	organisation science part formal/con	th how many ns located on your c did your firm have tractual agreements aimed at exchanging	In 2007, with how organisations loca science park did you interactions on a no contractual basis ( informal, social basis were aimed at exch knowledge?	ted on yo our firm h on- (i.e. sis) which	ave	located (as a n interac exchan person	7, with 1 d on you nanager/ ctions wing nging kr s worki sations	ir sciend directo hich we nowledg ng for t	ce park r) have ere aime ge? Con he	did you social ed at sider
Competitors										
Buyers Suppliers										
Innovation centres										
Public research labs										
University of Pretoria Consultants										
Sector institutes										
Others, namely:										

To what extent is the knowledge your firm receives from the most important partners/actors located on your science park under the following categories similar to your firm's own knowledge?

Similar: similarity between your firm's

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Please tick where appropriate

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knowledge and the knowledge from your most important partners/actors located on your science park Please indicate the level on a scale of 1 (not similar) to 7 (completely similar) Example of "completely similar": your firm possesses knowledge on radar technology and 1 3 2 your most important partner exchanges with you the same knowledge in this field 

Most important competitors							
Martinesteril							
Most important buyers							
Most important suppliers							
Most important innovation centres							
Wost important innovation centres							
Most important public research labs	_	_	_	_	_	_	
University of Pretoria							
-							
Most important consultants	П						
Most important sector institutes							
Others, normalize							
Others, namely:							

11. Org	anisational proximity		Please tick where appropriate						
	extent do the following statements apply to the relationship betwe the most important partners/actors located on your science park?	(compl	e indicate etely disa cagree) to	gree), 3 (1	1either di	sagree			
			1	2	3	4	5		
А.	Our firm has contacts with the same third parties (i.e. buyers, superc.) that our partners have	pliers,							
В.	Our partners have the same organisational routines and values as	our firm							
C.	Our partners have the same organisational structure as our firm								

12. Frequency of accessing knowledge and the usefulness of knowledge 12.1 Frequency Ι

How often does your firm access knowledge from the most important partners located on your science park?	Never	Rarely	Sometimes	Regularly	Always
Most important competitors					
Most important buyers					
Most important suppliers					
Most important innovation centres					
Most important public research labs					
University of Pretoria					
Most important consultants					
Most important sector institutes					
Others, namely:					

12.2 Usefulness	EIT VAN P TY OF PI	RETORIA	Plea	ise tick where	appropriate
How useful is the knowledge your firm receives from the most important partners located on your science park with regard to	THI YA PI	Please indico			
your firm's innovations?	1	2 □	3 □	<b>4</b>	5
Most important competitors					
Most important buyers					
Most important suppliers					
Most important innovation centres					
Most important public research labs					
University of Pretoria					
Most important consultants					
Most important sector institutes					
Others, namely: 13. Use of other knowledge sources			□ Plea	□ use tick where	appropriate

How often does your firm use the following sources from organisations/actors located on your science park to acquire Never Rarely Sometimes Regularly Always knowledge for your firm's innovations? Employing key scientists and engineers (including poaching 1. П key staff) from other firms/organisations located on/related to your science park Acquiring key information at conferences and workshops 2. organised by the science park management Reverse engineering of technological knowledge embedded 3. in products developed/produced by other firms/organisations located on/related to your science park 4. Accessing patent information filed by other firms/organisations located on/related to your science park 5. Knowledge embedded in organisational processes or routines of firms/organisations located on your science park 6. Publications in technical and scientific papers by other П П П firms/organisations located on your science park

#### Please note that the following questions are targeted at your firm's partners NOT located on science parks NETWORKING FOR INTENDED KNOWLEDGE FLOWS WITH OFF-PARK FIRMS

14. Degree centrality			Please write down the number
	In 2007, with how many organisations (NOT located on science parks) did your firm have formal/contractual agreements which were aimed at exchanging knowledge?	In 2007, with how many organisations (NOT located on science parks) did your firm have interactions on a <b>non-contractual</b> basis (i.e. informal, social basis) which were aimed at exchanging knowledge?	In 2007, with how many persons (NOT located on science parks) did you (as a manager/director) have social interactions which were aimed at exchanging knowledge? Consider persons working for the organisations under these categories.
Competitors			
Buyers			
Suppliers			
Innovation centres			
Public research labs			
Universities (excluding University of Pretoria)			
Consultants			
Sector institutes			
Others, namely:			

15. Geographical proximity		SITEIT VA	N PRETO	RIA		Please tick	onto on	a answa
What is the location of the most		SITHI Y	A PRETO	RIA			лиу он	e unswer
important partner/actor (under the	Not a portpor	Sama aitu				e located in:		road
following categories) with whom your firm exchanges knowledge?	Not a partner	Same city		ent city		er province	e Ab	road
				e province				 D
Most important competitor								
Most important buyer								
Most important supplier Most important innovation centre								
Most important public research lab								
Most important university								
(excluding University of Pretoria)								
Most important consultant								
Most important sector institute		_						_
Others, namely:								
16. Technological proximity					Ple	ease tick wh	ere app	propriat
most important partners/actors ( <b>NOT</b> park) under the following categories s knowledge?	imilar to your firm's own	1						
Similar: similarity between your firm's knowledge and the knowledge from your most important partner/actors (NOT located on your science park) Example of "completely similar": your firm innovates on the knowledge base of radar and your most important partner						el on a scale pletely simi		
exchanges with you the same knowled	lge in the field of radar	1	2	3	4	5	6	7
	Most important competit	ors						
	Most important buy	rers 🗆						
	Most important suppli	iers 🗆						
Most i	mportant innovation cent	res 🗆						
Most in	nportant public research la	abs 🗆						
Most important universities (exclu	iding University of Pretor	ria) □						
	Most important consulta	unts 🗆						
Мо	st important sector institu	ites 🗆						
Others, nan	nely:							
17. Organisational proximity					Ple	ease tick wh	ere app	propriat
			en your	(compl	etely disa	the level on gree), 3 (ne complete ag	ither di	
	TO I located on selence			1	2	3	4	5
To what extent do the following states firm and the most important partners (	TOT focated on science			1				
		. buyers, suŗ	opliers,					
firm and the most important partners ( A. Our firm has contacts with t	he same third parties (i.e.		-					



18.1 Frequency			Р	lease tick wher	e approprid			
How often does your firm access knowledge from the most important partners ( <b>NOT</b> located on your science park)?	Never	Rarely	Sometimes	Regularly	Always			
Most important competitors								
Most important buyers								
Most important suppliers								
Most important innovation centres								
Most important public research labs								
Most important universities (excluding University of Pretoria)								
Most important consultants								
Most important sector institutes								
Others, namely:								
8.2 Usefulness			Р	lease tick wher	e appropri			
How useful is the knowledge your firm receives from the most mportant partners ( <b>NOT</b> located on your science park) with			Please indicate the level on a scale of 1 (not useful) to 5 (completely useful)					
regard to your firm's innovations?	1	2	3	4	5			
Most important competitors								
Most important buyers								
Most important suppliers								
Most important innovation centres								
Most important public research labs								
Most important universities (excluding University of Pretoria)								
Most important consultants								
Most important sector institutes								
Others, namely:								
9. Use of other knowledge sources (with NO relation to science	parks)		Please tick where appropriat					
How often does your firm use the following sources from organisations/actors ( <b>NOT</b> located on science parks) to acquire knowledge for your firm's innovations?	Ne	ver Rare	ely Sometime	es Regularly	Always			
<ol> <li>Employing key scientists and engineers (including poachi- key staff) from other firms/organisations (NOT located or your science park)</li> </ol>								
2. Acquiring key information at conferences and workshops ( <b>NOT</b> organised by your science park)								
<ol> <li>Reverse engineering of technological knowledge embedde in products developed/produced by other firms/organisatio (NOT located on your science park)</li> </ol>								
4. Accessing patent information filed by other firms/organisations ( <b>NOT</b> located on your science park)								
<ol> <li>Knowledge embedded in organisational processes or routines of other firms/organisations (NOT located on you science park)</li> </ol>								
6. Publications in technical and scientific papers by other firms/organisations ( <b>NOT</b> located on your science park)								



## **QUESTIOINNAIRE FOR OFF-PARK FIRMS**



Impacts of networks on innovative performance of new technology-based firms ~ questionnaire for off-park firms									
	GENERAL INF	ORMAT	ION						
A. Contact information			Ple	ase provide an answer where applicable					
Name of your firm: Name of parent and/or daughter firm:	Parent firm: Daughter firm(s	).							
	Daughter min(s	).							
Name of contact person in your firm:									
Contact telephone number:									
Email address:									
B. Type of firm and main activities									
<b>B.1</b> Your firm is: When answering this question, use as the criterion the activity in which the highest percentage of sales was realized in 2007.	Please tick only A manufa A service Other type	cturing fir provider		an answer where applicable					
<b>B.2</b> What is the main activity of your firm?	<ul> <li>Please tick (can be more than one answer) or provide an answer where applicable</li> <li>Production of consumer goods</li> <li>Development of consumer goods</li> <li>Production of raw and refined materials</li> <li>Development of raw and refined materials</li> <li>Production of product parts and components</li> <li>Development of product equipment</li> <li>Development of product equipment</li> <li>Development of product equipment</li> <li>Transport (services)</li> <li>Financial services</li> <li>Business services (engineering, IT)</li> <li>Other</li> </ul>								
C. Location									
Please indicate where is your firm located			Pretoria	Other city, namely:					
D. Firm age and size			Ple	ease provide an answer where applicable					
In which year was your firm established?		Ye	ear: 						
Total number of employees (including directory your firm in 2005 (if applicable) and 2007?	-		2005	2007					
Total sales (if any) of your firm in 2005 (if applica (if sales volume is 1 million, please write 1,000,00			2005 R	2007 . R					

		SITEIT VAN PRET RSITY OF PRET	ORIA					
1. Innov	ated product/services	ESITHI YA PRET	<b>ORIA</b> appropriate:	only one answer is possible				
and/or se improve improve improve compare New: a p	<ul> <li>2005 and 2007, has your firm introduced products prvices into the market that were technologically d or new to your firm?</li> <li>d: an existing product/service which has clearly d technical specifications or increased usability d to a previous version product/service incomparable with previous products es of your firm and in which new technology is</li> </ul>	<ul> <li>Yes, products/services developed mainly by a third party</li> <li>Yes, products/services developed together with a third party</li> <li>Yes, products/services developed mainly by my own firm</li> <li>No. Please go to Question 4</li> </ul>						
embodie								
2. Produ	ct and/or service innovation and sales	Ple	-	an answer where applicable				
F.	How many patents did your firm file in 2005 (if apprespectively?	icable) and 2007	2005	2007				
G.	How many new products and/or services did your fin (if applicable) and 2007 but did not yet introduce to and 2007 respectively?	2005	2007					
H.	Do you have products on the market in 2007?		□ Yes. Please com □ No. Please go to	tinue with <b>Question D</b> Question 3				
I.	For 2007, give an indication of the distribution of sa and/or services of your firm that:	les of products Did not change	Distribution of to	tal sales 2007				
	Were tech	nologically improved	%	Total has to add up to 100%				
	Were	e technologically new	% .					
J.	In 2007, did your firm sell products/services that we	re not only	$\Box$ Yes $\longrightarrow$ Share	of total sales of these				
	technologically new or improved for your firm, but a	also technologically	produ	cts/services in 2007 was				
	new or improved in the <b>market</b> ? (i.e. your competite	ors had not already	appro	ximately:%				
	introduced such products/services)		□ No					
3. Other	results of product/service innovations		Ple	ease tick where appropriate				
	dicate to what extent your firm's product and/or nnovations in 2007 resulted in:		ate the extent on a scalar the interval $\frac{1}{2}$ $\frac{1}{3}$					
G.	Reduction of development and maintenance costs							
Н.	Quality improvement of products and/or services							
I.	Increases in production capacity							
J.	Improvement in delivery times							
К.	Increase in sales							
L.	Increase in profits							
4. Innov	ated processes	Please tick	where appropriate:	only one answer is possible				
processe new to y <i>Improve</i> higher p reliabilit <b>New:</b> a p	2005 and 2007, did your firm bring production s into use that were technologically <b>improved</b> or our firm? <b>d:</b> an existing production process, but with clearly erformance, less cost or improved production y process incomparable with previous processes of a and in which new technology is embodied	<ul> <li>Yes, processes d</li> <li>Yes, processes d</li> </ul>	eveloped mainly by a eveloped together wind together wind together wind together wind together togethe	th a third party my own firm				

Please tick where appropriate



	dicate to what extent your firm's process	Please indicate the extent on a scale of 1 (very little), 3 (not little and not much) to 5 (very much)							
		1	2	3	4	5	-		
G.	Reduction of development and maintenance costs								
н.	Quality improvement of products and/or services								
I.	Increases in production capacity								
J.	Improvement in delivery times								
K.	Increase in sales								
L.	Increase in profits								

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#### 6. Firm's level of knowledge and experience

To what	extent do the following statements apply to your firm?	Please indicate on a scale of 1 (strongly disagree), 3 (neither agree nor disagree)to 5 (strongly agree)					
I.	Most of the staff in our firm is highly skilled and qualified	1 □	<b>2</b> □	<b>3</b> □	<b>4</b>	5 □	
J.	Our firm invests substantially in training						
K.	Our firm innovates by improving other firms' products and processes						
L.	Most of the time our firm is ahead of our competitors in developing and launching new products						
М.	Our firm has the ability to adapt other firms' technologies						
N.	Our firm innovates as the result of R&D carried out within our own firm						
0.	Our firm has considerable resources and own knowlegde resources for technological development						
Р.	Our firm is able to introduce into the market innovations which are completely novel on a worldwide scale						
7. Trust							

UNIVERSITEIT

#### 7.1 Interorganisational trust Please tick where appropriate Please indicate on a scale of 1 (strongly disagree), To what extent do the following statements apply to your firm? 4 (neither agree nor disagree) to 7 (strongly agree) In general, the organisations with which my firm exchanges knowledge: 1 2 3 4 ----5 6 7 keep promises they make to our firm I. J. are always honest with us K. provide information that we can believe L. are genuinely concerned that our business should succeed M. consider our welfare as well as their own when making important decisions N. keep our best interests in mind **O.** are trustworthy it is not necessary to be cautious in dealing with them Р.

		4									
7.2 Interpersonal tru	ust		UNI	VERSITEIT VAN VERSITY OF	PRETO	RIA		Please i	tick whe	ere app	ropriate
				IBESITHI YA	PRETO	RIA 2	ate on a	scale of I	l (stron	gly dise	agree),
To what extent do the <b>In general</b> , <b>the perso</b>	e following stat <b>ms</b> with whom	ements apply to my firm exchan	your ges k	firm? nowledge:	4 (ne	ither ag	ree nor	disagree,	) to / (s 	trongly	agree)
		-	0	C	1	2	3	4	5	6	7
<b>F.</b> have alway	s been impartia	al in negotiations	with	us							
<b>G.</b> can always	be counted on	to act as we exp	ect								
<b>H.</b> are trustwo											
<b>I.</b> consider our interests even when it is costly to do so											
<b>J.</b> if their performance were below our expectations, we would feel a sense of betrayal											
8. Relationship with	firms on The	Innovation Hul	)								
knowledge with firms/organisations lo <b>The Innovation Hub</b> situated in Pretoria)?	firms/organisations located at <b>The Innovation Hub</b> (which is situated in Pretoria)?										
	ING FOR	INTENDE	D K	NOWLEDGE	E FLO	WS V	VITH				
9. Degree centrality	In 2007 with	how many		In 2007, with how	many		In 200	<i>Please v</i> )7, with ł			number
In 2007, with how many organisations located on The Innovation Hub did your firm have formal/contractual agreements which were aimed exchanging knowledge?			1	organisations loc Innovation Hub d have interactions of contractual basis informal, social basis were aimed at exc knowledge?	ated on T id your fi on a <b>non</b> (i.e. asis) whi	irm -	locate you (a social at exc persor	d on The as a mana interacti hanging as workin isations u	e Innova ager/dir ons wh knowle ag for th	ation H ector) h ich wer dge? C he	ub did ave re aimed onsider
Competitors											
Buyers Suppliers											
Innovation centres											
Public research labs											
University of											
Pretoria											
Consultants											
Sector institutes											
Others, namely:											
10. Technological pr	ovimity							Please	tick who	oro ann	ropriate
To what extent is the receives from the <b>mo</b> located on The Innovation following categories a knowledge?	knowledge you st important p ation Hub unde	partners/actors er the						1 10000 1	ich with	c upp	.opridite
Similar: similarity between your firm's knowledge and the knowledge from your most important partners/actors located The Innovation Hub. Example of "completely similar": your firm possesses knowledge on radar technology and your most important partner exchanges with you			Plea	ase indicate the leve	el on a so	cale of 1	' (not sin	nilar) to 2	7 (comp	pletely s	imilar)
the same knowledge in this field				1 2	3	4	4	5	6		7
	Most importa	ant competitors				I					
	Most in	nportant buyers				I					
	Most impo	ortant suppliers				I					
Most	important inn	ovation centres				I					

<u>4</u>							
	UNIVERSIT	ITY OF F	PRETOR	4	5	6	7
Most important public research labs							
University of Pretoria							
Most important consultants							
Most important sector institutes							
Others, namely:							
11. Organisational proximity					Pleas	se tick whe	re appropriate
To what extent do the following statements apply to firm and the most important partners/actors located of			your	(comple	tely disag		a scale of 1 ther disagree ely agree)
				1	2	3	4 5
<b>D.</b> Our firm has contacts with the same third p etc.) as our partners have	parties (i.e. bu	iyers, suppli	ers,				
E. Our partners have the same organisational			r firm				
<b>F.</b> Our partners have the same organisational							
12. Frequency of accessing knowledge and the use 12.1 Frequency	efulness of kn	lowledge			Pleas	se tick whe	re appropriate
How often does your firm access knowledge from th	e most						
important partners located on The Innovation Hub?		Never	Rarely	Somet	imes R	legularly	Always
Most important	competitors			E	]		
Most impo	ortant buyers			E	]		
Most import	ant suppliers			E	]		
Most important innov	ation centres			E	]		
Most important public	research labs			E	]		
Universit	y of Pretoria			E	]		
Most importan	t consultants			E	]		
Most important sec	tor institutes			E	]		
Others, namely:				E	]		
12.2 Usefulness		. <u> </u>	DÍ				re appropriate
How useful is the knowledge your firm receives from important partners located on The Innovation Hub w your firm's innovations?				<u>useful)_to</u>		n a scale o e <u>tely usefu</u> l <b>4</b>	
Most important	competitors			]			
Most impo	ortant buyers			]			
	-						_
Most import	ant suppliers		C	]			
Most import Most important innov							
-	ation centres			]			
Most important innov Most important public i	ation centres		C	]			
Most important innov Most important public i	ation centres research labs y of Pretoria			) )			
Most important innov Most important public i Universit	ation centres research labs ry of Pretoria t consultants			2 2 2			

#### 13. Use of other knowledge sources

#### UNIVERSITEIT VAN PRETORIA UNIVERSITY OF PRETORIA YUNIBESITHI YA PRETORIA

organisat	en does your firm use the following sources from tions/actors located on The Innovation Hub to acquire ge for your firm's innovations?	Never	Rarely	Sometimes	Regularly	Always
7.	Employing key scientists and engineers (including poaching key staff) from other firms/organisations located on/related to The Innovation Hub					
8.	Acquiring key information at conferences and workshops organised by the science park management of The Innovation Hub					
9.	Reverse engineering of technological knowledge embedded in products developed/produced by other firms/organisations located on/related to The Innovation Hub					
10.	Accessing patent information filed by other firms/organisations located on/related to The Innovation Hub					
11.	Knowledge embedded in organisational processes or routines of firms/organisations located on The Innovation Hub					
12.	Publications in technical and scientific papers by other firms/organisations located on The Innovation Hub					

#### Please note that the following questions are targeted at your firm's partners NOT located in The Innovation Hub NETWORKING FOR INTENDED KNOWLEDGE FLOWS WITH OFF-PARK FIRMS

	O FOR INTERDED RIV	OWLEDGE LLOWS WI	
14. Degree centrality			Please write down the number
	In 2007, with how many organisations (NOT located on The Innovation Hub) did your firm have formal/contractual agreements which were aimed at exchanging knowledge?	In 2007, with how many organisations (NOT located on The Innovation Hub) did your firm have interactions on a <b>non-</b> contractual basis (i.e. informal, social basis) which were aimed at exchanging knowledge?	In 2007, with how many persons (NOT located on The Innovation Hub) did you (as a manager/director) have social interactions which were aimed at exchanging knowledge? Consider persons working for the organisations under these categories.
Competitors			cutegones.
Buyers			
Suppliers			
Innovation centres			
Public research labs			
Universities (excluding University of Pretoria)			
Consultants			
Sector institutes			
Others, namely:			
15. Geographical prox	imity		Please tick only one answer

15. Geographical proximity				Please tick on	ly one answer
What is the location of the most important partner/actor (under the following categories) with whom your firm exchanges knowledge?	Not a partner	Same city	With respect to my firm, Different city but same province	they are located in: Other province	Abroad
Most important competitor					
Most important buyer					
Most important supplier					
Most important innovation centre					
Most important public research lab					
Most important university					
(excluding University of Pretoria)					
Most important consultant					
Most important sector institute					
Others, namely:					



TORIDEST	101 10	FREIV					
To what extent is the knowledge your firm receives from the most important partners/actors ( <b>NOT</b> located on The Innovation Hub) under the following categories similar to your firm's own knowledge?							
Similar: similarity between your firm's knowledge and the knowledge from your most important partner/actors (NOT located on The Innovation Hub) Example of "completely similar": your firm innovates on the knowledge base of radar and your most important partner					el on a scale npletely simi		
exchanges with you the same knowledge in the field of radar	1	2	3	4	5	6	7
Most important competitors							
Most important buyers							
Most important suppliers							
Most important innovation centres							
Most important public research labs							
Most important universities (excluding University of Pretoria)							
Most important consultants							
Most important sector institutes							
Others, namely:							
					1		
17. Organisational proximity					lease tick wh		
To what extent do the following statements apply to the relationshi firm and the most important partners ( <b>NOT</b> located on The Innova							
<b>D.</b> Our firm has contacts with the same third parties (i.e. buy etc.) that our partners have	yers, suppli	ers,	1 • □	<b>2</b> □	3 □	<b>4</b>	5 □
E. Our partners have the same organisational routines and v	alues as ou	r firm					
<b>F.</b> Our partners have the same organisational structure as or	ır firm						
18. Frequency of accessing knowledge and the usefulness of knowledge and the sefulness of knowledge and the setup.	owledge						
18.1 Frequency				P	lease tick wh	ere appro	opriate
How often does your firm access knowledge from the most important partners ( <b>NOT</b> located The Innovation Hub)?	Never	Rarel	y Some	etimes	Regularly	Alwa	ys
Most important competitors							
Most important buyers							
Most important suppliers							
Most important innovation centres							
Most important innovation centres							
Most important innovation centres Most important public research labs							
Most important innovation centres Most important public research labs Most important universities (excluding University of Pretoria)							
Most important innovation centres Most important public research labs Most important universities (excluding University of Pretoria) Most important consultants							

# UNIVERSITEIT VAN PRETORIA Please tick where appropriate UNIVERSITY OF PRETORIA Please tick where appropriate ives from the most I (not useful) to 5 (completely useful)

18.2 Usefulness

How useful is the knowledge your firm receives from the most important partners ( <b>NOT</b> located on The Innovation Hub) with	<i>I (not useful) to 5 (completely useful)</i>					
regard to your firm's innovations?	1	2	3	4	5	
Most important competitors						
Most important buyers						
Most important suppliers						
Most important innovation centres						
Most important public research labs						
Most important universities (excluding University of Pretoria)						
Most important consultants						
Most important sector institutes						
Others, namely:						

19. Use	19. Use of other knowledge sources (with NO relation to science parks)		Please tick where ap			
organisa	ten does your firm use the following sources from ations/actors ( <b>NOT</b> located on The Innovation Hub) to acquire lege for your firm's innovations?	Never	Rarely	Sometimes	Regularly	Always
7.	Employing key scientists and engineers (including poaching key staff) from other firms/organisations ( <b>NOT</b> located on The Innovation Hub)					
8.	Acquiring key information at conferences and workshops ( <b>NOT</b> organized by The Innovation Hub)					
9.	Reverse engineering of technological knowledge embedded in products developed/produced by other firms/organisations ( <b>NOT</b> located on The Innovation Hub)					
10	Accessing patent information filed by other firms/organisations ( <b>NOT</b> located on The Innovation Hub)					
11.	Knowledge embedded in organisational processes or routines of other firms/organisations ( <b>NOT</b> located on The Innovation Hub)					
12.	Publications in technical and scientific papers by other firms/organisations ( <b>NOT</b> located on The Innovation Hub)					