Innovating Services in Science and Technology Parks

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Abstract

Science and Technology Parks are in the business of providing services to their tenants, a mix of large companies, Small and Medium Enterprises and startups. The service needs of each of these types of companies will be different. The quality of services can be improved by understanding the needs of the tenants both, prior to building the Science and Technology Parks as well as on an ongoing basis. This paper introduces the CUGAR model for Science and Technology Parks as well as Service Innovation Design framework. It then proceeds to discuss how the Service Innovation framework could be applied to Science and Technology Parks. It uses an example to show how services can be prioritized and selected for implementation within the available budget.

1. Background

Science and Technology Parks be it technology parks, business parks or industrial parks have been used as a catalyst in the flow of knowledge and human capital from institutions of higher learning to the markets. Science and Technology Park managers are essentially service providers to a mixed group of tenants who are their customers. Science and Technology Parks should continuously innovate the services offered to their customers in order to stay competitive and relevant. This paper provides a framework and methods that managers of Science and Technology Parks could utilize for continuously innovating the services provided to its customers.

Section 2 of this paper provides an introduction to CUGAR model for Science and Technology Parks. It also lists a set of critical success factors for Science and Technology Parks, relationship between Parks and their different types of customers and suggests a template for measuring the effectiveness of their services. This is followed by a section that introduces service innovation in general and outlines the framework and methodologies that could be used for innovating services using some examples from the consumer industry. Section 4 outlines how Science and Technology Parks could use the framework and methodologies described in section 3 to continuously design service innovations. The last section provides a summary.

2. Science and Technology Parks

A triple helix model that consisted of three freely overlapping spheres representing Government, Industry and Universities was advanced by Henry Etzkowitz and Loet Leydesdorff (Etzkowitz 2000, Etzkowtiz 2007, and Laydesdorff 1998) emphasizing the growing influence and importance of universities in a knowledge economy. Several such studies have since followed (Battelle 2007, IASP, and Wessner 2009). Narasimhalu had recently recommended extending the Triple Helix model to include research labs and investment community (Narasimhalu 2013) and named it CUGAR. Figure 1 shows the CUGAR model.

Figure 1 Participants in the CUGAR model of Science and Technology Parks

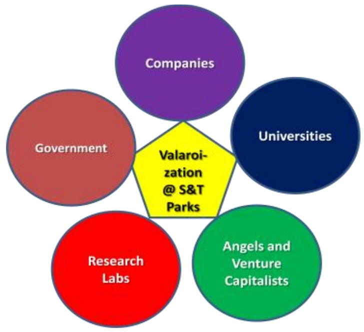


Figure 2 reproduces Critical Success Factors for Science and Technology Parks as defined in his paper. He listed the relationship between Science and Technology Park managers and the different type of tenants of the parks as shown in Table 1. Table 2 shows a sample template for measuring the effectiveness of the services provided by a Science and Technology Parks as reported in his paper.

Figure 2 Critical Success Factors of a Successful Science and Technology Park

Table 1 Relationship between services and companies in a Science and Technology Park

Type of Service	Relevance / Requirement		
	Large Companies	SMEs	Start-ups
Accounting	Not very relevant	Relevant for small companies	Very relevant
Business Consulting	Not very relevant	Optional	Very relevant
Food and Beverage	Very relevant	Very relevant	Very relevant
ICT infrastructure	Very Relevant	Very relevant	Very relevant
Industrial Design	Occasional use	Relevant	Very relevant
Intellectual property	Occasional use	Very relevant	Very relevant
Investment Community	Only the banks	Banks, VCs and PEs	Early Stage VCs
Legal	Not very relevant	Relevant	Very relevant
Market research	Relevant	Relevant	Very relevant
Networking Sessions	Very relevant	Very relevant	Very relevant
Patent attorneys	Very relevant	Very relevant	Very relevant
Public and Media Relations	Not very relevant	Somewhat relevant	Very relevant
Science and Technology consulting	Occasional use	Relevant	Not relevant
Security	Very relevant	Very relevant	Very relevant
Shared lab and other facilities	Less relevant	Relevant	Most relevant
Transportation	Relevant	Relevant	Relevant

The management of a STP should use a template such as the one shown in Table 2 for monitoring, measuring and managing the value it offers to its tenants. It is important that a benchmarking template will have to be designed to match the mix of tenants that a STP houses. Any attempt to rank Science and Technology Parks using a standard template would be futile since no two parks are likely to have the exact mix of tenants.

Table 2 A sample template for measuring the effectiveness of a STP

<table>
<tr><th rowspan="2">Type of Service</th><th colspan="3">Relevance to the tenant mix</th></tr>
<tr><th>Weak</th><th>Average</th><th>Strong</th></tr>
<tr><td>Access to early adopters</td><td rowspan="18">Meets the requirements of 0 - 30 % of its tenants</td><td rowspan="18">Meets the requirements of at between 30 -75 % of its tenants</td><td rowspan="18">Meets the requirements of more than 75% of its tenants</td></tr>
<tr><td>Accounting</td></tr>
<tr><td>Business Consulting</td></tr>
<tr><td>Flexible physical infrastructure</td></tr>
<tr><td>Food and Beverage</td></tr>
<tr><td>ICT infrastructure</td></tr>
<tr><td>Industrial Design</td></tr>
<tr><td>Intellectual property</td></tr>
<tr><td>Investment Community</td></tr>
<tr><td>Legal</td></tr>
<tr><td>Market research</td></tr>
<tr><td>Networking Sessions</td></tr>
<tr><td>Patent attorneys</td></tr>
<tr><td>Public and Media Relations</td></tr>
<tr><td>Science and Technology consulting</td></tr>
<tr><td>Security</td></tr>
<tr><td>Shared lab and other facilities</td></tr>
<tr><td>Transportation</td></tr>
</table>

3. Service innovation

Service Innovation has been gaining attention from academia and industry in the recent years (Barras 1986, Bettencourt 2002, Brown 2006, CRIC 2006, Coombs 2000, Fitzsimmons 2001, Howells 2000, Teboul 2006, Tether 2002, Tether 2003, Tether 2004, Tidd 2003 and Tien and Berg 2003). IBM has been spearheading the movement to define a framework for service innovation (Horn 2005, Maglio 2006, Spohrer 2007 and Tien 2003). A number of clear differences separate service innovations from product innovations. A main differentiated feature of service innovations as acknowledged by the practitioners is their shorter life cycles. Services generally have backstage and front stage[1]. Backstage is not generally not visible to the customers and front stage is where the service provider interacts with the customers. Innovations in the back stages are generally better protected than those in the front stage which are visible to customers and competitors alike.

We introduce a simple service innovation opportunity identification method called Quick and Dirty Innovation Method (QaDIM) developed by Narasimhalu (Narasimhalu 2012) in section 3.1. That section also provides an example for creating service innovations in Airlines industry. Section 3.2 introduces the concept of temporal value chain for services innovations and defines a Service Design Matrix for recording the innovation opportunities before, during and after a service is rendered. That section explains the use of the service design matrix using movies as an example. Section 3.3 discusses how to prioritize and select innovation opportunities for implementation using a normalization process. That section continues to use cinema hall as a service. Section 3.4 introduces Service Innovation Design

[1] See article number 16 listed under references

Canvas and Service Innovation Value Curve to decide how to design and apportion control of services across providers and consumers of a service.

3.1 Quick and Dirty Innovation Methodology (QaDIM) for service innovation

A sample QaDIM canvas that is a three by three matrix with cells numbered from 1, 1 to 3, 3 is shown in Figure 3.

In the sample QaDIM Canvas shown in figure 1, innovation generation operator (IGO) "Increase Scope" is placed in cell number (1, 1) and its complement "Decrease Scope" is in diagonally opposite cell numbered (3, 3). IGOs "Add a Feature" and "Remove a feature" have been placed in cells (1, 2) and (3, 2) respectively. IGOs "Combine two services into one" and "Separate a service into two" have been placed in cells numbered (2, 1) and (2, 3) respectively. The last pair of IGOs "Embed existing service into another service" and "Embed another service into existing service" have been placed in cells numbered (1, 3) and (3, 1) respectively.

Figure 3 Sample QaDIM Canvas

Increase the scope of service (1, 1)	Add a feature (1, 2)	Embed existing service into another service (1, 3)
Combine two services into one (2, 1)	Existing service (2, 2)	Separate existing service into two (2, 3)
Embed another service into existing service (3, 1)	Remove a feature (3, 2)	Reduce the scope of the service (3. 3)

IGOs generally come in pairs. Each operator takes the form "Verb Phrase" where Verb refers to some type of action and Phrase describes the action. QaDIM Canvas can be enlarged into a central cell surrounded by an even number of cells.

3.1.1 An example using QaDIM for service innovation

Figure 4 presents an example of identifying service innovation opportunities using Airlines as an existing service offering. Placing Airlines in the centre cell and applying the eight operators listed in Figure 3 results in the service innovation opportunities shown in Figure 4. Please note that applying an operator on an existing service may not sometimes produce an innovation opportunity.

Figure 4 Service Innovations for airlines using QaDIM

Increase the number of flights to a destination in a day	Install larger screens for better entertainment experience	A conference package to include air ticket
Allow customers to buy one ticket for air travel and onward bus travel	Airlines	Separate and F&B thus allowing multiple permutations

Include WIFI access within the airplane	Stop serving alcohol in the plane	Consolidate and hence reduce the number of destinations

3.2 Temporal aspects of service innovations

In this section we introduce Service Design Matrix that was developed by Narasimhalu (Narasimhalu 2009) to represent the temporal value chain of services and help identify innovation opportunities along the value chain. Section 3.2.1 introduces the Service Design Matrix while section 3.2.2 provides an example using movies as a service, and section 3.3 provides a normalization method for prioritizing innovation opportunities identified using this method.

3.2.1 Service Design Matrix

The template of a generic Service Design Matrix (SDM) is presented in Table 3.

The columns capture service elements in a service value chain. There are three sets of columns in the SDM representing service elements before, during and after a service is provided. The first set of columns B_1, …, B_b capture service elements related to a service before a customer is serviced. Each link corresponds to an activity. The second set of columns D_1, …, D_d captures the service elements in the value chain when a customer is experiencing the service. The third set of columns A1, …, A_a capture the service elements in the value chain after a consumer has experienced the service. The desired set of service elements can be generated either through customer surveys or by using the service innovation design tool such as QaDIM described in section 1.1.

Each of the links is temporally ordered, i.e. B1 happens before B2, and B2 happens before B3. Also all the Bs happen before Ds and all the Ds happen before the As. We shall refer to the Bs as the “Before” service value sub-chain, the Ds as the “During” service value sub-chain and the As as the “After” service value sub-chain. Each value sub-chain could consist of several activities. B_1 to B_b are examples of activities under the value sub-chain “Before.” Each of the cells at the intersection of rows and columns of the Service Design Matrix is called a Service Innovation Cell.

Table 3 Service Design Matrix Template

		Temporal Value Chain / Process →								
		Before			During			After		
		B_1	…	B_b	D_1	…	D_d	A_1	…	A_a
Value Drivers	V1									
	V2									
	V3									
	V4									
	V5									
	V6									
	V7									
	V8									
	V9									

3.2.2 An example of using Service Design Matrix for service innovation

Movie viewing as a service is discussed in this section. The columns of the Service Design Matrix are first discussed in section 3.2.2.1 and then the rows of the service design matrix in section 3.2.2.2.

3.2.2.1 Defining the temporal service chain for watching a movie

When we plan to go to a cinema to view a movie, the first thing we do is to find out information about the different movies currently playing, their timings and possibly reviews by movie critics. This results in a browsing activity. We may choose to browse either off-line using advertisements in newspapers or browse on-line using any of the aggregated service providers or the portals of cinema operators.

The first step we do is purchase a ticket either on line or at the counter. Next we would like to pick the seats for viewing the movie. If we assume these two successive activities to be representative of a movie viewer, then we would end up defining two columns in the "Before" value sub-chain for the following three activities.

B_1 – Purchasing tickets
B_2 – Selecting seats

The "Before" service value sub-chain will be $B_1 \rightarrow B_2$

A service innovation designer should follow a similar exercise in defining the entire temporal value chain / process for the service being examined. Possible value sub-chains and their activities for 'During' and 'After' value sub-chains of the movie viewing process are given below.

D_1 – Viewing Quality (no occlusions including from those seated in the previous row)
D_2 – Enjoy good audiovisuals (AV)

The "During" service value sub-chain will be $D_1 \rightarrow D_2$

A_1 – Dining after viewing the movie (F&B)
A_2 – Exiting the movie hall without much climbing up or down (Exit)

The "After" service value sub-chain will be $A_1 \rightarrow A_2$

The elements in the three sub-chains will form the columns of the Service Design Matrix.

3.2.2.2 Defining the Value Drivers for viewing a movie

Value drivers that a customer would not mind paying for are discussed in this section. The following are an example of the value drivers of a typical movie watching customer. They will form the rows of the Service Design Matrix.

V_1 – Ease	V_2 – Efficiency	V_3 – Flexibility
V_4 – Pricing	V_5 – Quality	V_6 – Variety

3.2.2.3 Constructing the Service Design Matrix for viewing a movie

Figure 5 presents the Service Design Matrix for watching a movie using the service value chain and value drivers discussed in sections 3.2.2.1 and 3.2.2.2

Figure 5 Sample Service Design Matrix for watching a movie

	Movie Watching Service Value Chain					
	Before		During		After	
	Ticketing	Seat Choice	Viewing	AV	F&B	Exit
Ease						
Efficiency						
Flexibility						
Pricing						
Quality						
Variety						

The next step would be to pick the value drivers considered important by the customers for each of the elements in the Service Value Chain. This could be done either through observation or surveys. An 'X' is placed in Service Innovations Cells that are considered to be important by customers. Figure 6 represents customer choices.

Figure 6 Capturing customers preferences for the service value chain

	Movie Watching Service Value Chain					
	Before		During		After	
	Ticketing	Seat choice	Viewing	AV	F&B	Exit
Ease	X					x
Efficiency	X		x			x
Flexibility	X				x	
Pricing	X				x	
Quality		x	x	x	x	
Variety					x	

It is important to have all the cells marked x prioritized for further consideration.

3.3 Normalizing the Service Design Matrix

The first step is to prioritize the value drivers for each of the elements in the value chain. The Service Innovation Cells under each of the columns is rank ordered based on customer inputs. Rank 1 indicates the service innovation cell most desired by customers. Figure 7 presents the ranks for each of the elements identified as important by the customers.

Figure 7 Prioritizing the innovations in each of the columns of the Service Design Matrix

	Movie Watching Value Chain					
	Before		During		After	
Tasks	Ticketin g	Seat choice	Viewin g	AV	F&B	Exit
Value Drivers						
Ease	1					1
Efficiency	3		2			2
Flexibility	2				3	
Pricing	4				4	
Quality		1	1	1	2	
Variety					1	

A well balanced approach to translating inputs from customers into action is to ensure that every element in the service value chain is given equal priority. In other words every Service Innovation Cell with a rank 1 is to be considered first before considering any Service Innovation Cell with a rank of 2. All the value drivers chosen as priority 1 are compared and they are then prioritized as per customers' inputs. These are the ones ranked 1A, 1B, …, 1F. This is repeated for those Service Innovation Cells ranked 2, 3, etc. until all the ranked Service Innovation Cells have been considered. The resulting Service Design Matrix is shown in Figure 8.

One approach in prioritizing service innovations across all the elements of the value chain and value drivers would be to reorder from them from 1 till the last, 14 in this example. First, select all the Service Innovation Cells ranked 1. In this example we have 1A, 1B, 1C, 1D, 1E and 1F. These six need to be ranked from 1 to 6 based on customer inputs. The, select all the Service Innovation Cells ranked 2. There are four Service Innovation Cells 2A, 2B, 2C and 2D. These most desired by customers should be ranked 7 to the least desired by the customers ranked 10. This process is repeated with those elements with all the Service Innovation Cells with ranks until a total ordering is achieved. The process described in this paragraph is called normalization and the normalized Service Design Matrix is shown in Figure 9.

Figure 8 Service Design Matrix with Priorities across all elements and value drivers

	Movie Watching Service Value Chain					
	Before		During		After	
Tasks	Ticketing	Seat choice	Viewing	AV	F&B	Exit
Value Drivers						
Ease	1E					1F
Efficiency	3B		2A			2C
Flexibility	2B				3A	

Pricing	4A				4B	
Quality		1C	1B	1A	2D	
Variety					1D	

Figure 9 Normalized Service Design matrix

	Movie Watching Value Chain					
	Before		During		After	
Tasks	Ticketing	Seat choice	Viewing	AV	F&B	Exit
Value Drivers						
Ease	5					6
Efficiency	12		7			9
Flexibility	8				11	
Pricing	13				14	
Quality		3	2	1	10	
Variety					4	

3.3.1 Costing for the innovations

It is also important for service innovation designers to understand the costs of implementing an innovation. Table 4 captures estimated costing of the innovations selected for consideration in Figure 9.

Table 4 Estimated costs of service innovations

Value Driver	**Task**	**Cost in dollars**
Ease	Ticketing	200,000
Ease	Exit	300,000
Efficiency	Ticketing	50,000
Efficiency	Viewing	500,000
Efficiency	Exit	250,000
Flexibility	Ticketing	100,000
Flexibility	F&B	500,000
Pricing	Ticketing	50,000
Pricing	F&B	50,000
Quality	Seat Choice	50,000
Quality	Viewing	200,000
Quality	Audio Visual	1,000,000
Quality	F&B	100,000
Variety	F&B	50,000

3.3.2 Selecting the innovations for implementation

This section discusses the method for selecting service innovations for implementation using entries in the Normalized Service Design Matrix in Figure 9 and the cost estimates of service innovations presented in Table 4. Assume that a budget of 2 million dollars is available for implementing service innovations. You will start selecting the innovations for implementation as per the overall priorities defined in the Normalized Service Innovation Matrix until the budget is exhausted or the residual budget is not sufficient for implementing any of the remaining service innovations. During the selection process there may be a service innovation of a higher priority whose cost does not fall within the residual budget and in such a case such a service innovation is skipped and the selection for implementation proceeds with the remaining service innovations. Table 5 captures such a selection process using a budget of 2 million dollars, the priorities established in Figure 9 and the cost estimates presented in Table 4.

Table 5 Selecting the service innovations for implementation

Service Innovation		Priority	Cost	Remaining budget	Remarks
Value Driver	Task			2,000,000	Total budget
Quality	Audio Visual	1	1,000,000	1,000,000	
Quality	Viewing	2	200,000	800,000	
Quality	Seat Choice	3	50,000	750,000	
Variety	F&B	4	50,000	700,000	
Ease	Ticketing	5	200,000	500,000	
Ease	Exit	6	300,000	200,000	
Efficiency	Viewing	7	500,000	200,000	Skip, Insufficient budget
Flexibility	Ticketing	8	100,000	100,000	
Efficiency	Exit	9	250,000	100,000	Skip, Insufficient budget
Quality	F&B	10	100,000	0	Stop, Budget exhausted
Flexibility	F&B	11	500,000	0	
Efficiency	Ticketing	12	50,000	0	
Pricing	Ticketing	13	50,000	0	
Pricing	F&B	14	50,000	0	

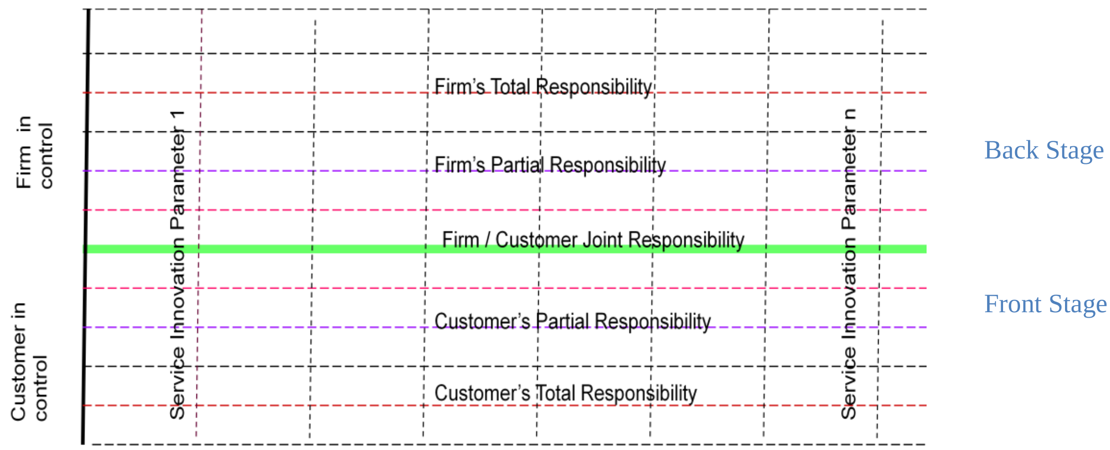
Clearly the method used above is only one approach. The management of the firm, a movie house in this case, may be willing to revisit the budget allocation to go strictly by the priorities in which case "Efficiency of Viewing" might be selected for implementation and the rest of the innovations may not be implemented if there is inadequate budget.

3.4 Service Innovation Design Canvas

Since most service situations involve real time interaction between a service provider and a service consumer, it is often important to design the right level of interaction or controls that each side is allowed to exercise. Defining the extent of flexibility given to service consumers is addressed by the Service Innovation Design Canvas and the Service Innovation Value Curve described in this section.

Figure 10 presents a Service Innovation Design Canvas that binds customer interactions with a service providing firm. This canvas has two sections – the first section called "Customer in Control" (CIC) and the second called "Firm in control," (FIC). The FIC part is above the midline and the CIC is below the midline. The midline represents the situation where the responsibility and control is equally and jointly owned and exercised by both the customer and the firm and is labelled "Both in Control," (BIC).

Figure 10 Service Innovation Design Canvas representing the dynamics of Customer-Firm relationship.

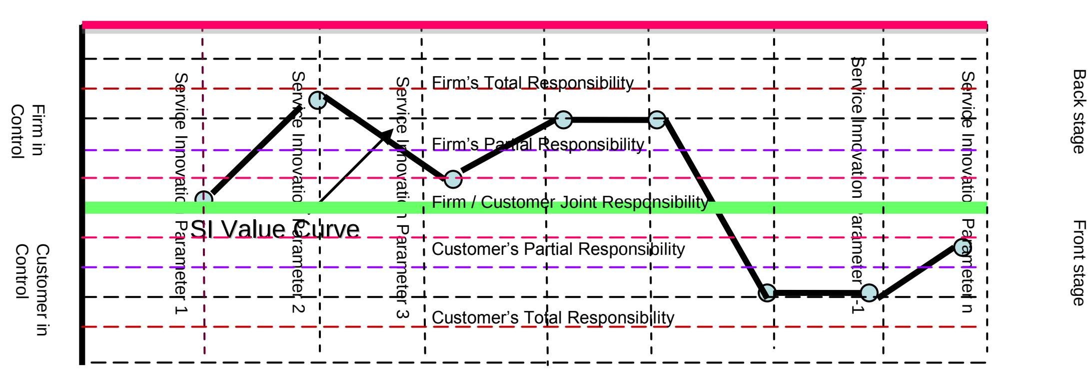


The CIC section corresponds to the front stage. Any innovation in this space will be visible to both the customers and competitors of the firm. The FIC section corresponds to the back stage. Any innovation in the backstage is invisible to a firm's customers and competition.

The horizontal lines define the party controlling an interaction and the extent of control. The horizontal line in the middle represents the situation when both a firm and its customers have equal influence in making decisions about a Service Innovation Parameter. The horizontal line labelled Customer's partial responsibility in a CIC section represents the situation when a customer has more control than a firm. The horizontal line labelled Firm's partial responsibility in FIC section represents the situation when a firm has more control than its customers.

Each vertical line represents one Service Innovation Parameter (SIP). A SIP is defined to be a feature of the service provided by the firm. Each Service Innovation selected in Figure 7 is a potential Service Innovation Parameter. Figure 11 shows a Service Design Canvas with a Service Innovation Value Curve. A Service Innovation Value Curve is a visual representation of the value a service provider offers to its customers. It is a visual tool for experimenting with different values offered to the customers by selecting different combination of values for the Service Innovation Parameters.

Figure 11 Sample Service Design Canvas with Service Innovation Value curve



3.4.2 An example

Figure 12 presents the Service Innovation Design Canvas and a Service Innovation Value Curve using a Food and Beverage service provider such as a restaurant as an example.

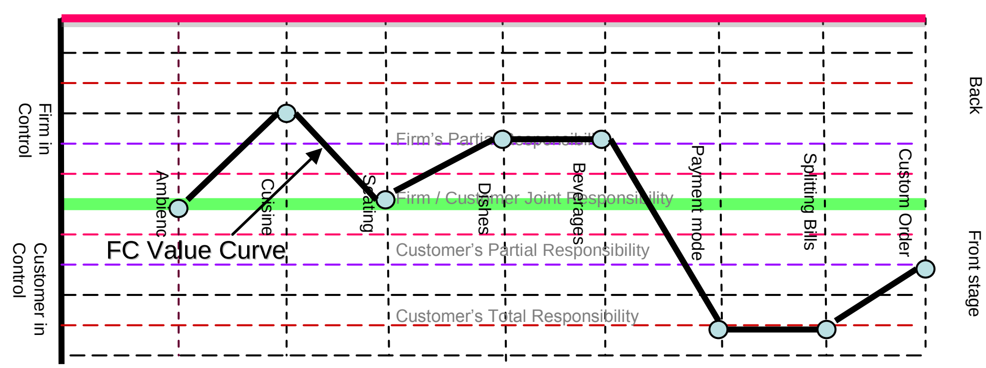
Let the Service Innovation Parameters chosen by the restaurant be:

- Ambience
- Cuisine
- Seating
- Dishes
- Beverages
- Payment Mode
- Splitting Bills
- Custom Order

The restaurant can choose to retain control of all these parameters or share some of the interactions with their customers.

From the service innovation value curve, it is clear that the firm has decided to jointly manage with its customers, the ambience for the restaurant and the seat reservations. This would result in some seats being assigned at the discretion of the restaurant operator while the others could be listed on a web for the customers to choose. It has decided that it shall exercise total control over the cuisine. The restaurant has further decided that it will take inputs regarding the dishes it should prepare and the beverages it should serve. It has further allowed the customers to decide on the payment modes and whether and how to split the bill. It will give some inputs to customers who wish to order custom dishes but will defer the final decision to them.

Figure 12 A Service Innovation Design Canvas with a Value Curve for an F&B service



4. Applying Service Innovation Tools to service management at Science and Technology Parks

This section applies the service innovation concepts described in Section 3 to Science and Technology Parks. Section 4.1 presents a method for calculating the priority of different services based on the tenant mix. Section 4.2 discusses how a Science and Technology Park manager can plan the operational and capital expenditure required for providing the services. Section 4.3 addresses the service interaction between the managers and the tenants of a Science and Technology Park. Section 4.4 shows an example on how to apply the temporal value chain concept to determine the values sought by the tenants.

4.1 Determining the service priorities

We begin with the nature of services provided by the Science and Technology Park management to its tenant mix. Let us consider a modified version of Table 1 as a representative set of services provided to the tenants of a Science and Technology Park. The modified version of Table 1 is shown in Table 6. We could use any method such as the one listed below to determine the priorities of services.

a. First select for consideration all the services required by all tenants.
   I. Use a service requirement weighting scheme such as the one shown below with respect to relevance.
      i. Most relevant – 5
      ii. Very Relevant – 4
      iii. Relevant – 3
      iv. Partially relevant / occasional use – 2
      v. Optional – 1
      vi. Not relevant – 0

   II. Use a tenant mix weight that represents the proportional mix of tenants. For example, if 60 % of the tenants are SMEs, 25 % are large firms and 15 % are start ups then the tenant mix weight will be 0.25 for large firms, 0.6 for SMEs and 0.15 for start-ups.

   III. Compute the Total Weighted Score which is obtained by the sum of the products of tenant mix weight and service requirement weight across all types of tenant mixes
b. Then rank the services. The service with the highest Total Weighted Score should have the highest rank and the service with the lowest Total Weighted Score should have the lowest rank. Table 6 presents the Total Weighted Scores and the ranks of services
c. Next, select the services for implementation based on the method described in the next section.

Table 6 Weights and ranks of the different types of services.

Type of tenants →	Large Companies	SMEs	Start-ups	Total weighted score	Rank
Tenant mix Weight →	0.25	0.6	0.15		
Type of Service					
Accounting	Not relevant	Relevant for S	Very relevant	0*0.25+2*0.6+4*0.15 = 1.8	15
Business Consulting	Not relevant	Optional	Very relevant	0*0.25+1*0.6+4*.15= 1.2	17
Finance (Banking)	Very relevant	Very relevant	Very relevant	4*0.25+4*0.6+4*0.15 = 4	1
Food and Beverage	Very relevant	Very relevant	Very relevant	4*0.25+4*0.6+4*0.15 = 4	1
ICT infrastructure	Very Relevant	Very relevant	Very relevant	4*0.25+4*0.6+4*0.15 = 4	1
Industrial Design	Occasional use	Relevant	Very relevant	2*0.25+3*0.6+0.4*.15=2.9	11
Intellectual property	Occasional use	Very relevant	Very relevant	2*0.25+4*.06+4*.015 = 3.5	8
Investment Community	Only the banks	Banks/VCs /PEs	Early Stage VCs	4*0.25+4*0.6+4*0.15 = 4	1
Legal	Not relevant	Relevant	Very relevant	0*0.25+3*0.6+4*0.15 = 2.4	13
Market research	Relevant	Relevant	Very relevant	3*0.25+3*0.6+4*0.15 = 3.15	9
Networking Sessions	Very relevant	Very relevant	Very relevant	4*0.25+4*0.6+4*0.15 = 4	1
Patent attorneys	Very relevant	Very relevant	Very relevant	4*0.25+4*0.6+4*0.15 = 4	1
Public and Media Relat.	Not relevant	Partial. relevant	Very relevant	0*0.25+2*0.6+4*0.15 = 1.8	15
S& T consulting	Occasional use	Relevant	Not relevant	2*0.25+3*0.6+0*0.15 = 2.3	14
Security	Very relevant	Very relevant	Very relevant	4*0.25+4*0.6+4*0.15 = 4	1
Shared facilities	Optional	Relevant	Most relevant	1*0.25+3*0.6+5*0.15 = 2.8	12
Transportation	Relevant	Relevant	Relevant	3*0.25+3*0.6+3*0.15 = 3	10

4.2 Figuring out the economics

The next step in the design will be to determine the annual costs / revenues, pay back period and the control structure for the different services to be provided by the Science and Technology Park Manager. Table 7 represents a Service Design Table along with a sample set of services. A Science and Technology Park manager can determine the services that the park would like to provide using Priority as determined in Table 6, Annual cost or revenue, investment required, payback period and Control as decision and design factors.

In this table a bank in the proposed Science and Technology Park is expected to yield an annual rental of 240,000 dollars. Any investment for renovation of the bank's premises will have to be borne by the bank; hence the Park manager does not have to set aside any investments. And the bank will decide on the operating hours and the quality and type of services it will provide to the tenants of the Park.

On the other hand, Infocomm infrastructure is shown to require an annual maintenance cost of 500,000 dollars with an initial investment of 1 million dollars with a payback period of 10 years. Service providers such as IP firms, Patent Attorneys and Industrial Design are best determined based on inputs from tenants. Shared services are an example where the Park manager and tenants need to jointly determine the scope of the services provided. A Science and Technology Park manager may decide not to offer some of the services with lower priority if the budget is insufficient. Payback period for services such as networking sessions is hard to quantify. Networking sessions can be organized at cost and will contribute to improved good will and brand equity rather than financial returns.

Table 7 Service Design Table

Decision factors	Priority	Annual (Cost)/ Revenue in $	Investment required	Payback period	Control
Service					
Banking	1	240,000	0	0	Mostly Bank
Food and Beverage	1	300,000	0	0	Jointly
IC infrastructure	1	(500,000)	1,000,000	10	Mostly STP manager
Investment community	1	(100,000)	0	2	Mostly tenant
Networking sessions	1	(250,000)	250,000	?	Jointly
Patent Attorneys	1	120,000	0	0	Absolutely by tenant
Security	1	(200,000)	0	0	Mostly STP manager
Intellectual Property	8	200,000	0	0	Absolutely by tenant
Market research firm	9	200,000	0	0	Absolutely by tenant
Transportation	10	100,000	0	0	Jointly
Industrial Design	11	250,000	0	0	Absolutely by tenant
Shared services including labs	12	300,000	1,500,000	7	Jointly
Legal services	13	500,000	0	0	Absolutely by tenant
Science and Technology consulting	14	250,000	0	0	Absolutely by tenant
Public and Media Relations	15	200,000	0	0	Absolutely by tenant
Accounting	15	200,000	0	1	Absolutely by tenant
Business consulting	17	500,000	0	1	Absolutely by tenant

All the costs / revenues shown in Table 7 are in addition to the cost of building or rentals for the physical facilities. Also, entries in that table are only an example and not a prescribed formula. A Science and

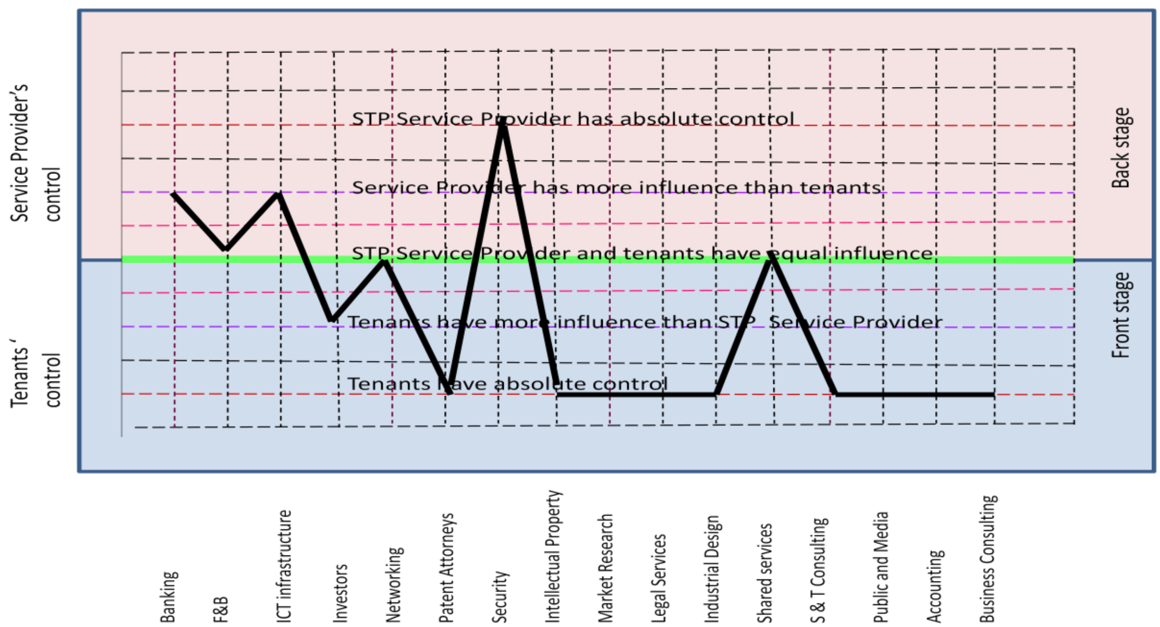
Technology Park manager should decide what is best for the tenant mix based on the nature and proportion of their tenants.

4.3 Designing the Service Interaction

We next design the Service Innovation Value curve using the Service Innovation Design Canvas presented in Figure 10 in Section 3.4 as shown in Figure 13. The Service Innovation Canvas is created using the types of services provided on the X axis and the control in the last column of Table 7 is used to construct the Service Innovation Value Curve. As one can see from Figure 13, the Service Innovation Value curve is only one of several value curves that could be generated through all possible permutations of the different levels of interaction controls.

The decision to let tenants have total control over service interaction for services such as Intellectual Property, Market Research, Legal Services and Industrial Design as indicated in Figure 13 implies that such a Science and Technology Park manager has agreed to allow tenants directly book the meeting times with their chosen service providers using an intranet provided by the Park manager. Such a calendaring system would certainly improve the quality of service that an STP manager can provide to its tenants.

Figure 13 Service Innovation Value Curve for the services shown in Table 7



4.4 Examining the Temporal Value Chain

Next step would be to use the Service Design Matrix shown in Figure 3 to decide the types of support a Science and Technology Park's clients would need before, during and after a service. Such a design should be based on a set of value drivers that are important to the tenants. Figure 14 shows a sample temporal value chain design for shared services such as labs. The design should be firmed up in consultations with tenants since this is designated as a joint responsibility in Table 7 and the Service Innovation Value Curve.

Science and Technology Park manager should also determine the relative priorities of these requirements in consultations with its tenants. The cost of providing these services should be documents. The Park manager can then choose those services that can be provided within the budget set aside for the shared services. Where budget is no limitation then a Science and Technology Park Manager could start with such an exercise in order to determine the budget requirements.

Figure 14 Designing the temporal value chain for shared services provided by STP

	Shared Services Value Chain					
	Before		During		After	
	Reserving time of use	Nature of resources required during this time	Consumables required during use	Support required during use	Cleaning services required	Payment
Ease	Anytime, anywhere, from any device	Number of workstations required		Tech support at 10 minutes notice	Cleaning services required 10 minutes before end of session.	Multimodal payment options with specified payment limits
Efficiency		Available 15 minutes before use				Prearranged standing orders for payment
Flexibility	Ability to change the booking. Choice of Service Level agreements (SLAs)	Ability to request for additional or fewer workstations		Additional tech support perhaps within 30 minutes of request		Ability to increase the payment limit within two minutes of notification
Quality	As per selected SLA	Clean, ready to use		As per selected SLA		Payment confirmation within two minutes of payment.

5 Summary

This paper first introduced the CUGAR model for promoting open innovation in Science and Technology Parks. It then introduced previously developed method and a framework for identifying, selecting and designing service innovations. It then discussed how the method and framework can be applied to Science and Technology Parks. These are merely examples and should not be interpreted as a comprehensive design of a Science and Technology Park. Each Science and Technology Park has to determine the breadth and depth of services to be provided to their tenants based on its unique tenant mix and the service quality they would like to provide within the budget constraints. Good STP managers would want to offer the best possible services to their tenants within the budget constraints. We hope this paper would be used by Science and Technology Park managers for designing their service innovations.

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