

Implementing Quality Function Deployment (QFD) in STPs; Higher Competitiveness through Understanding the Voice of Clients

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Abstract:

Enterprises which have accommodated in STPs engage in a continuous process of innovation because they need to offer competitive quality to their own customers. The more an enterprise innovative, the more changing services requires. Quality Function Deployment (QFD) is a planning tool used to fulfill STP clients' expectations which are utilized to drive service development process in STP. Mechanism in which demands of tenants will be deployed to STP processes is simply called demand and supply method of tenants' voice of STP. Four phase approach was implemented in seven steps to incipient high-level client wants and requirements and finish with well-defined services requirements that should be considered by service providers. The output from the voice of the client tables-the most prioritized needs-feeds the first matrix, called the service planning matrix. House of quality matrix formed for the most prioritized services based on service pyramid introduced by Rustom Lalkaka to identify technical attribute of qualitative feature of client needs. Other matrixes will show service and process features.

Key Words: Quality function Deployment, Service-client morphology, service pyramid

1-Introduction

Science and Technology Park Tenants demands have increased not only because of tenants' own search for choice and diversity but also because of the need for support due to deficiencies of existing value creator services. STPs respond to this increased demand in a number of ways, commoditizing their services to offer high-value, low-cost alternatives where efficiency is driven, but often with a cost to service effectiveness. An alternative response by some STPs is to try to move up the customer value chain and to provide a higher-quality premium services which can be tailored to meet changing tenant needs. STPs of today, however, have the operational structures, the measurement systems, the technology, the

processes or the practice to continually look on ever changing tenant needs and to respond appropriately [1].

Quality Function Deployment (QFD) is a planning tool used to fulfill customer expectations which are utilized to drive service development process in STP. This planning tool will help STPs to handle dynamism which exist in their relationship with their clients and translate their expectations into STP procedures. QFD will help STP clients to maintain their competitive advantage in the market by providing right data in the right time at a right place. QFD helps identify new quality technology and job functions to carry out operations and minimize design errors. In other word, QFD is a way to capture, organize, and deploy the voice of STPs' tenants. QFD has often been associated with product development activities, but has found new applications in service industry as well. The QFD concepts and tools are useful to people involved in manufacturing and providing services in its long-run and short-run applications. An important QFD tool, the house of quality, when applied as a simple cause-and-effect matrix, shows the process's input–output relationships with the varying strengths between the different inputs and outputs. This structure takes a process map and makes it come alive for ongoing control efforts and further improvement efforts in STP processes [2, 3].

2-Hearing voice of STP Clients

The changing expectations and requirements of tenants is a complex challenge for STPs as the voice of their clients may not be understood well because of confusion and misinterpretation. Instead of working on what the tenants expect, works are concentrated on fixing what is existing and tenant doesn't want. Science and Technology Park (STP) as a supporting mechanism for its knowledge-base clients need a system to guarantee sound translation of STP client voice to STP procedures and plans.

Enterprises which have accommodated in STPs engage in a continuous process of innovation because they need to offer competitive quality to their own customers. The more an enterprise innovative, the more changing services requires satisfying its customers. On the other hand service providers which have been selected in STPs must be able to provide services based on ever changing demands of STP tenants. A successful STP should to translate its tenant voice to their service providers through sound processes. In fact the desired efficiency for the communicative–persuasive and engineering–organizational channels can be assured with brisk structures and coordinated activities, as well as by better relations with customers and suppliers. Suppliers have long been considered as passive servers; only recently have they been called both- Tenants and Suppliers- to collaborate with their specific experiences in the development of new services, and to participate actively in service provision and improvement flow. To achieve this fruitful relationship, STPs have to introduce new methodologies for their selection, defining, and for monitoring their contributions to design and implementation of service process [4, 9].

For better tenant satisfaction, STPs should have taken many initiatives, from the creation of Tenant Management Information Systems(TMIS) oriented to the evaluation of customer expectations to the evaluation of service feedbacks to solve the tenant's complains or proposals. Figure 1 shows the environment and mechanisms which enable STPs to hear the voice of its clients.

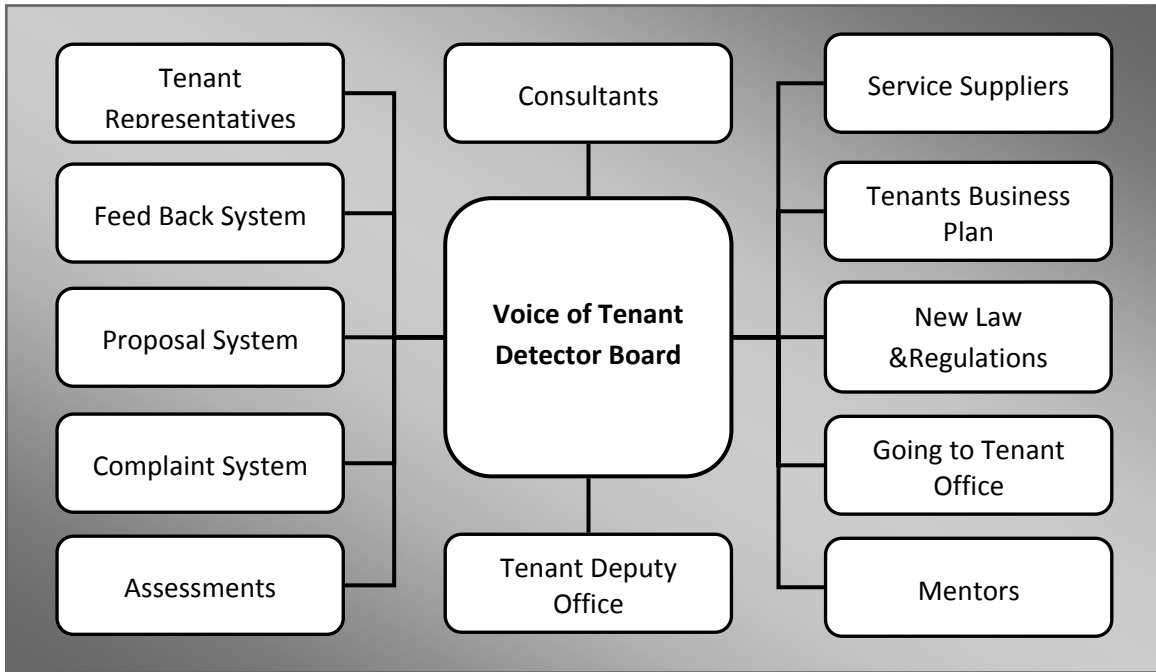


Fig1. Voice of STP tenants detection through different mechanisms

Mechanism in which demands of tenants will be deployed to STP processes is simply called demand and supply method of tenants' voice of STP. As Figure 2 shows Tenants needs will be collected directly or indirectly through different processes. On the supply side, services will be quantified through QFD mechanism in design processes and will be applied in the processes via processes' reengineering. Finally improved services will be monitored in quality improvement efforts such as TQM.

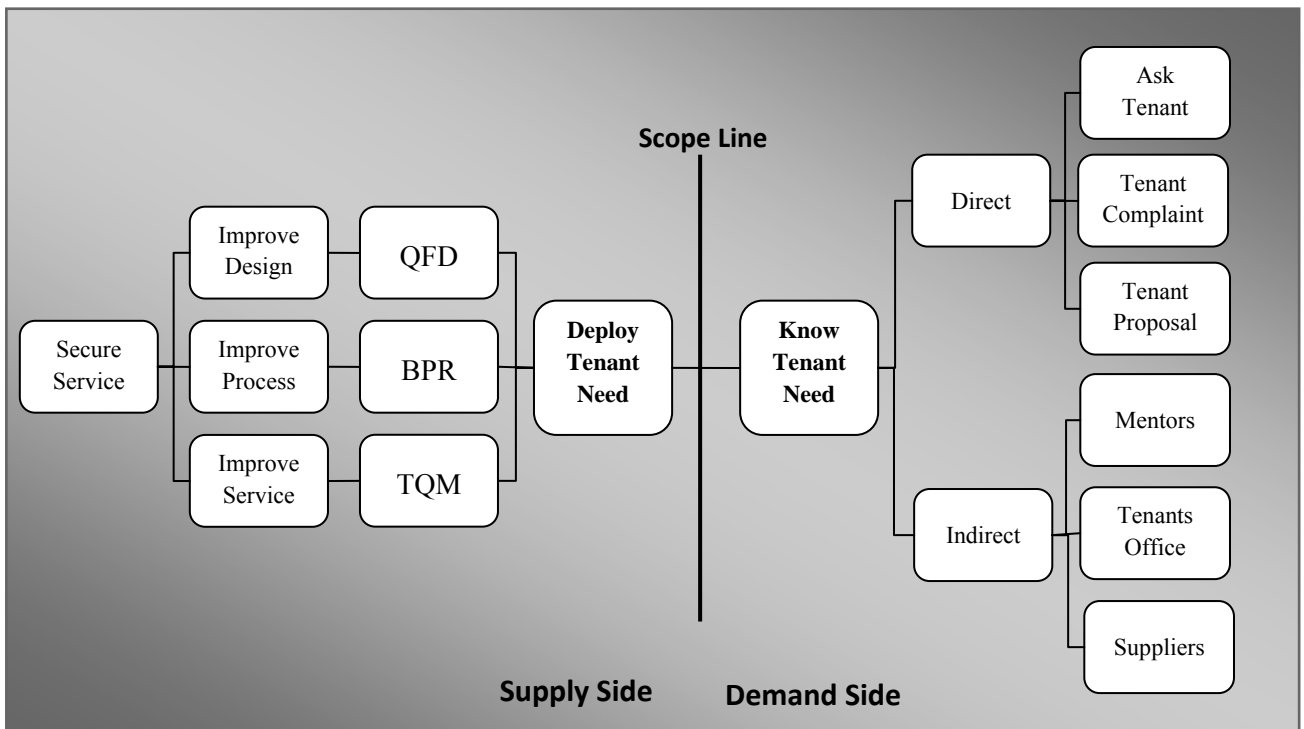


Fig2. Supply and Demand Method to satisfy STP tenants

3- Effect of STP processes on its clients

Science and Technology Park is a service provider for its clients. The most important asset of STPs is skilled staffs and service providers which deliver intangible and hard to evaluate services. The intangible nature of STP services makes it nearly impossible to analyze production of professional services and evaluate its quality. These services are so important for STP's clients because of their direct effect on their final product and as a whole will affect their competitive situation in market [8].

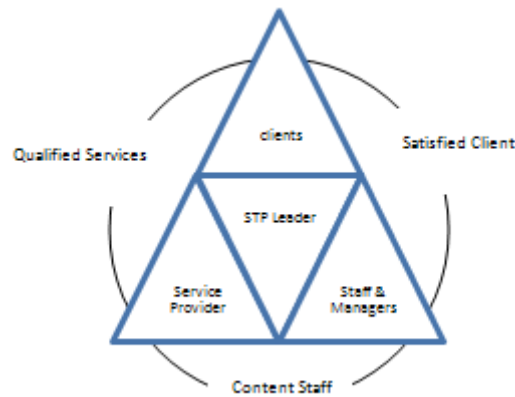


Figure3. STP Environment and relationship among its segments

The main factors for better STP's management are client managements, human resource management, and outsourced service providers' management. Client's perceptions of service are influenced by the nature of service offered and its effect on their product or service they deliver to the market. Effectively managing clients and expectations is often important to building a sustained STP. Human capital unlike physical capital is not easily quantified, necessitates assessment based on assumptions and predictions, can be leveraged through STP alignment, it is often not fungible, can have multiple applications without reducing value and can depreciate if underused or disused. Successful STPs can provide or handle intangible services with high quality to satisfy client expectations. Interaction between STP staffs, service providers and STP clients is so dynamic that the value of the interaction often can't be predicted or measured. STP processes and procedures which could be derived from strategic planning or top to bottom programs and based on mentioned principals are depicted as below.

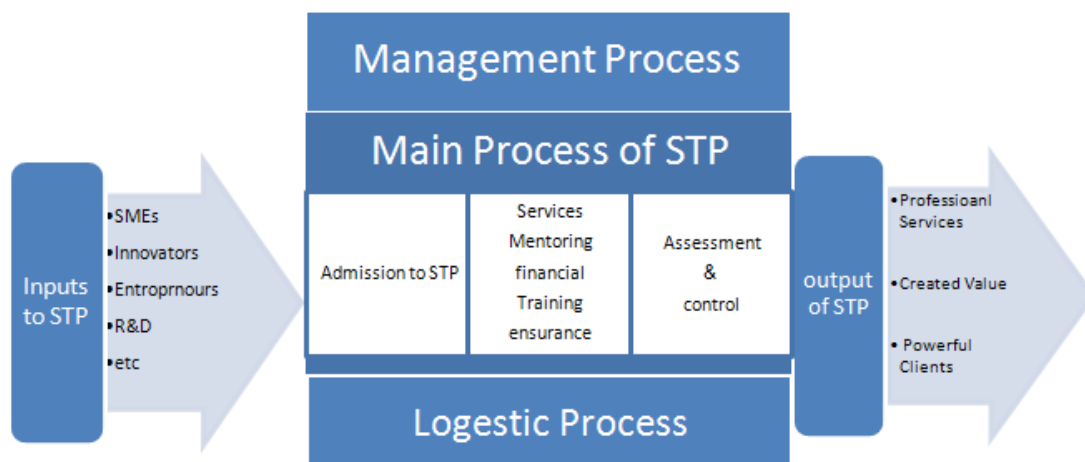


Figure4. STP procedures and Process based on conceptual design of STP leader duties

Designing internal procedures built on ever changing clients requirements need continuous improvement system which obtain client requirement and translate them into STP procedures.

4-Methodology of getting STPs voice and Translating into Processes

Tenants' success, in which the services exactly match their perceptions and requirements, is the new focal point. Most STPs, however, measure their success by undertaking customer satisfaction surveys. The survey is usually introduced service has been experienced by the client. Usually the survey collects only the information that the STP believes is important; and very few take into account the context in which the customer is using the services. This method gets the voice STP tenants not only by surveys but also try to measure clients' satisfaction in terms of what the enterprise can deliver to its customer base on client feedbacks to the STP. In order to sense the needs of STP clients and respond to these, a STP should ask itself some critical questions which their answer will shape the service morphology which will be provided by STP.

- 1 Who uses the services?
- 2 How the services designed and how it will be used?
- 3 Do they improve clients' professional business?
- 4 which group of client will use the services?

The answers to these questions reveal the client context in which services create value, and the extent to which client success is or is not secured. In order to create true client success, based on the outcomes of service in relation to the clients context and clients' definition of value – not against internal, self fulfilling functional statistics of STP, four-phase approach of QFD was utilized.

Four-phase approach is a series of matrices popularized by the American Supplier Institute (ASI) consists of four matrices. These start with high-level client wants and requirements and finish with well-defined services requirements that should be considered by service providers. The output from the voice of the client tables-the most prioritized needs- feeds the first matrix, called the service planning matrix. Service planning changes the client defined requirements into substitute quality characteristics, which quantify the client requirements and enable specialist to have design targets. The second matrix takes the high-level quantified concept and defines the components or parts of the system. The third matrix details the process layout and the fourth matrix gives the measures and monitoring needed to assure consistent sound service processes. According to this approach seven steps designed to shape requirement matrixes to design service processes and the standards for services provided by suppliers. It typically as follows:

1. Define the service's customers, specifically their expectations
2. Analyze the expectations of clients from three quality perspectives: normal, expected, and exciting.
3. Prioritize clients' requirement.
4. Translate these "voices" into technical objectives. This is where QFD bridges a major gap between the users of the services and the suppliers. This is an extremely useful exercise because it gives the providers specifics on which design efforts have the most value to the clients and which are less important.
5. Draw on the initial translation of the technical objectives to determine how each of the clients' expectations can best be satisfied.
6. Plan for services. The objectives focused on for the concept and design drive the manner of production. The QFD structure invites early consultation and input from the people involved in planning process. The collaboration of design activities is what makes the ramp up rapid and the initial and ongoing service provision smooth. If post-introduction demand increases,

operations have a much better chance of supplying consistent product quickly because of the guidance from QFD.

7. Update the original client expectation QFD matrices as the services ages and the client requirement changes. If the original QFD matrices are updated as new information becomes available, services launch time can be further reduced and new services can be introduced in progressively shorter cycles.

5- Yazd Science and Technology park case study

The first step in QFD is to determining the variety of clients and perceiving their characteristics to get their voice through mechanisms in which has been defined before. These requirements will be stipulated exactly as they have been mentioned in the form of verbatim. These verbatim will be organized in appropriate groups.

As Rustam lalkaka has studied in his previous works, science and technology support systems such as STPs can serve 7 groups of services which their importance grow to the top of service pyramid. His studies have been used as a fundamental for categorizing STP client verbatim as it was shown below. Management must make efforts to move up the pyramid towards higher value-adding services [5, 6].

- G) Services on legal, security, IP issues
- F) Seed equity capital, technology sourcing
- E) Skills development, mentoring and counseling
- D) Support on information & international networking
- C) Synergy among clients through exchange of experiences
- B) Shared office facilities, equipment, pre- & post-incubation
- A) Smart space that is functional, affordable and on flexible terms

To distinct each group of clients from the others, service-client Morphology was applied to categorized clients based on different characteristics such as, the user of service, the location of serving, the period which service is available etc. Table1 shows service-client morphology of Yazd Science and Technology Park (YSTP) typically. Indeed, it is obvious that importance of each service alter among different group of STP clients. Incubator residents need more consultants on basic issues such as marketing and technical matters, whereas research centers require lawyer consultancy on patent filling.

It is clear, each group of clients has its own specific needs and each verbatim has its own weight for specific group of clients. As a result Rustam lalkaka Importance pyramid of services cannot be applied for all groups of STP clients. So In order to prioritizing service requirements of STP clients, Simple Average weight method was preferred to apply to survey which had been declared by different group of clients. Meanwhile other methods such as Kano or AHP can be implemented on the surveyed data.

Table1. Morphology of STP service – client

	Innovation center	Incubator	Multi-Tenant Resident	Industrial R&D	Public & Private research centers	High-value service providers
Who uses the Services?	Innovator	Incubatees	SMEs	Industrial R&D companies	Different sectors of research centers	suppliers
Where is Used?	Innovation center	Incubators	Multi tenant Buildings	R&D centers	Different Research centers	In their company
How is the service used?	With subsidies	With subsidies	Without Subsidies	Without Subsidies	Without Subsidies	Without subsidies
When is the service used?	During Residency	During incubation period	During their contract	During their residency	During their residency	During their residency
How it was monitored?	Innovation center management	By Incubator managers	Auditor	auditor	auditor	By Tenants

To identify the contribution of each client group to the STP mission 4 definite STP goals was measured as the impact of each client group in the STP mission. Table2 shows mean data by five STP specialists. Table2 data was depicted in figure5 to show each client group contribution [10].

Table2. Contribution of each client group to the STP Mission

	Wealth creation	Enterprise Creation	Commercial. Research	International presence & Investment	Contribute to STP Mission
Innovator	30	20	30	20	0.0625
Incubatees	60	100	60	30	0.36
Multi- tenant SMEs	90	60	70	80	0.5625
Industrial R&D	90	40	70	60	0.4225
research centers	80	30	90	70	0.44
Hi- Value suppliers	90	20	20	20	0.11

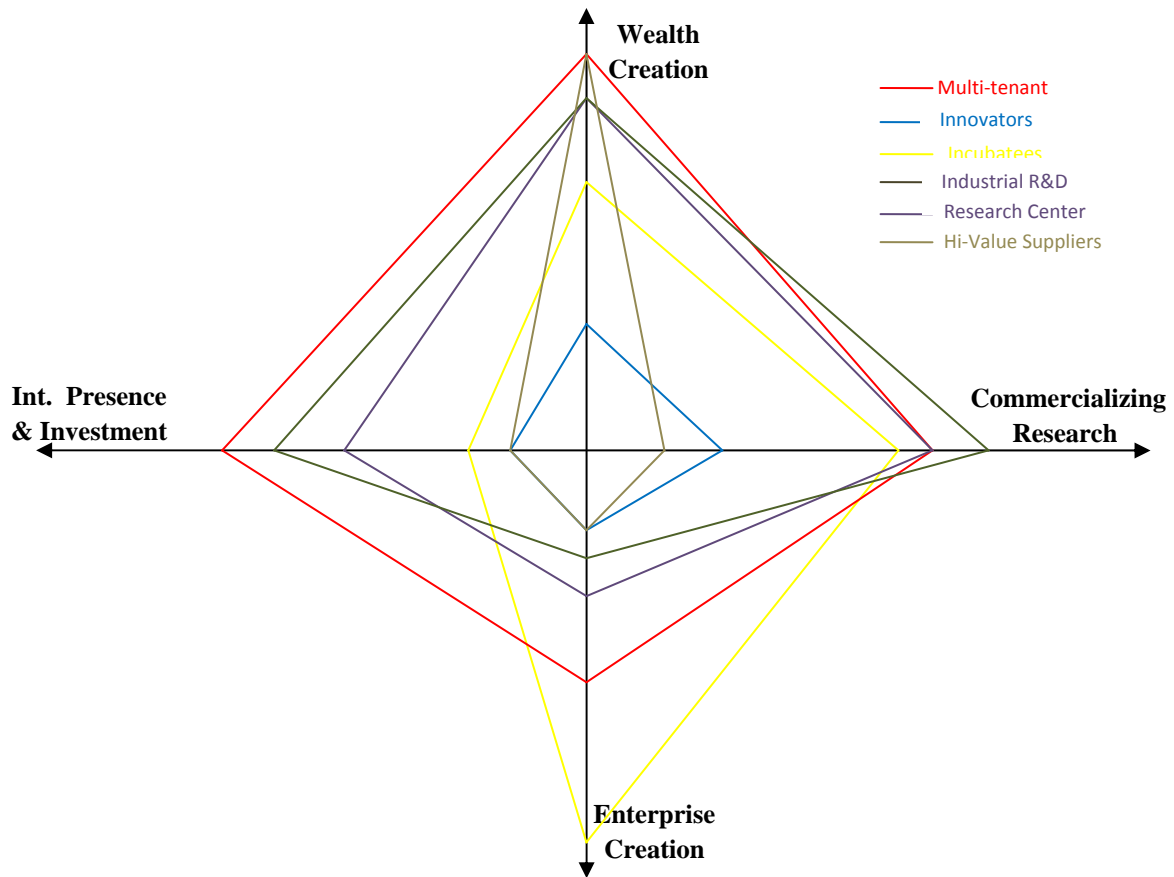


Figure 5. Amount of each client group in STP mission

A simple useful way is to ask selective numbers of STP clients from different groups to distribute 100 points to the importance of each group of their needs. Table 3 shows the mean data from each group of clients.

Table 3. Extracting importance of Lalkaka Pyramid for each group of clients

High-value service providers	Public & Private research centers	Industrial R&D	Multi-Tenant Resident	Incubator	Innovation center	
5	90	90	70	50	60	G
5	10	10	40	90	60	F
30	60	60	70	80	60	E
70	60	60	80	70	40	D
50	70	80	90	90	90	C
20	20	20	40	80	80	B
60	60	60	70	80	60	A

The result matrix is generated by summing up weighted scores multiple each group importance for each service. Table 4 shows the prioritized services based on lalkaka defined services which have been considered for YSTP. As it was shown in table 4 service C (Synergy among clients through exchange of experiences) is the most important service among the seven groups of services for YSTP Management.

Table4. Prioritizing services which have provided in YSTP

priority	High-value service providers	Public & Private research centers	Industrial R&D	Multi-Tenant Resident	Incubator	Innovation center	
139.3	0.55	39.6	38.025	39.375	18	3.75	G
67.825	0.55	4.4	4.225	22.5	32.4	3.75	F
126.975	3.3	26.4	25.35	39.375	28.8	3.75	E
136.525	7.7	26.4	25.35	45	29.575	2.5	D
158.75	5.5	30.8	33.8	50.625	32.4	5.625	C
75.75	2.2	8.8	8.45	22.5	28.8	5	B
130.275	6.6	26.4	25.35	39.375	28.8	3.75	A

After then, for each group of services which have been concluded, the house of quality would be formed. Variety of services and updated procedures, time to deliver services, cost and quality of services will be considered as well as the most critical and important technical issues . Implementing QFD on a STP needs two types of committees, new services and improving existing services. These committees are composed of members from Marketing, Planning, Finance, and client office. QFD committee will develop a clear vision, set long term goals and direct the QFD program. Output of QFD committee must be utilized in 2 ways:

- 1- Including QFD committee outputs in STP Business plan or strategic plan and
- 2- Reengineering the existing procedures in STP to serve new services.

House of quality would be formed for the first and foremost prioritized services, Synergy among clients through exchange of experiences, as it has been shown in figure 6. This house will be formed for other services too.

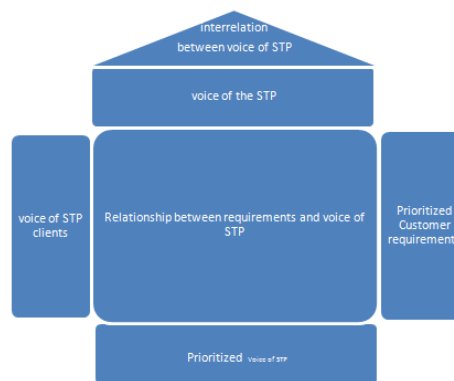
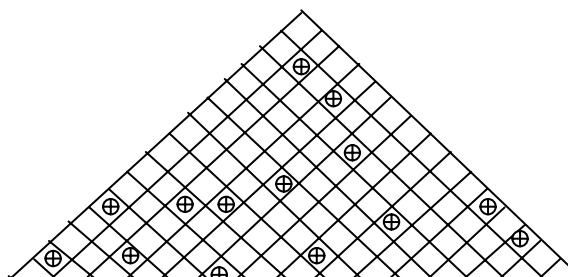


Figure6. House of Quality for QFD Analysis

The house of quality is the primary tool used in QFD to translate the voice of customer into design requirements that meet specific target values and matches that against how STP will meet those new requirements. By building house of quality for STP, every day changing customer expectations are used to drive the design process of new services and improving existing services. Figure 7 is the sample of QFD house of quality in first step to achieve technical attributes of services which served to STP clients.



Result(%)	Correction Coefficient	STP Position	Planned value based on BP	Priority	Easy Access to consultancy	Attraction to exchange of experience	Ability to introducing members	Ability to grow members beneficiary	Ability to grow trustfulness	Ability to foster cooperation	Fruitful cooperation	Low network membership cost	High performance communicative infrastr.	Relevant fields of int. network to SMEs	Relevant to STP client fields	Web solution	Subsidies aid for international membership	Creating virtual network	International technical networks	National technical networks	
8	.4	3	7	3		○						○			○			Δ	●	National cooperation with other SMEs	
1	.2	1	5	1								○		○	○		●	Δ	●	International cooperation with others	
26	.5	5	9	5	Δ		○						●		○			○		Infrastructure for easy cooperation	
8	1	3	3	3			○			Δ										Publishing introductory leaflet	
8	1	3	3	3		○	○				○		Δ							Holding conferences in relevant issues	
8	.6	3	5	5				○	○		○				Δ			Δ		Consortium of cooperation	
8	.4	3	7	3		○					●	●					●			Financial aid for cooperation	
8	.4	3	7	3		○			Δ	Δ		●		○				○	○	Creating clients network	
1	.2	1	5	3			○	○	○	○					○					Support joint venture	
8	.4	3	7	3	●	○					Δ						Δ			Consultancy for cooperation	
8	.6	3	5	3					●	●	Δ									Regulation infrastructure	
8	.4	3	7	1		○			●		○						Δ			Training team work	
					14	32	28	16	31	21	33	26	15	5	25	14	12	21	3	15	Priority of technical attribute
					8	4	0	0	9	1	0	7	4	1	6	4	4	6	1	5	Priority of technical attribute (%)

Figure7. House of quality for selective service with high priority among the others

Technical attribute of synergy features have been depicted in the 1st matrix. Priority of qualitative needs of STP clients has been drawn against technical attributes. 30 other matrixes would be formed to extract service features, process features and benchmarks to control the service processes. Features of processes and services which have been extracted from direct needs of STP clients would help STP clients to access more efficient services. If the process considered conversely, process control features will provide some standards which help STP control mechanism to assess service suppliers and STP service providers. Provided services will have high quality because of the implemented supervision on the service processes. Meanwhile some indices can be achieved to control services provision processes. The results

would be high quality services which would enhance STP clients competitiveness in the markets.

Conclusion:

Voice of STP clients was fed to the house of quality matrixes and technical attribute of prioritized service (Synergy among clients through exchange of experiences) was extracted from the 1st matrix. Technical attributes fed to the 2nd matrix to achieve service process features and finally its outcome was used as a income for the last matrix to form control mechanism features. Benefits of implemented QFD for a STP can be expressed as:

- 1- Client expectations and requirements translated into STP procedures and as a result, provided services by STP and its service providers meet client expectations. Clients will receive the more fitted services.
- 2- Flexible, effective and more productive structure in STP will be formed.
- 3- QFD will provide documents which are used as feed for any SPC (statistical process control) tool. A data base for future process or procedure design created. Data are saved in orderly manner to serve future needs. QFD and created SPC tools will help more flexibility in planning and organizing of STP.
- 4- Reduced cost of changing procedures in STP because of dynamism which are exist in the QFD process and provide top to bottom STP engagement.
- 5- QFD will reduce implementation time of changes and increase STP flexibility in provided service which is essential to newly formed expectation of clients.
- 6- An environment of teamwork among STP staffs, managers and clients to implement more productive procedures in STP.

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