The Application of Quality Function Deployment to Purpose Supplementary Approaches for Providing Services of Small Clinics in Bangkok and Perimeter Area for Business Survival

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Abstract

This research was the mixed method research and aimed to study the factors affected the designing process for providing services of the small low-cost clinics in Bangkok and perimeter areas by using Quality Function Deployment (QFD), and to purpose the supplementary approaches for providing services of the small low-cost clinics in Bangkok and perimeter areas. The research steps of this research were categorized following; step 1 conducting the qualitative research by collecting data through in-depth interview, this interview consisted of three clinic doctors, six clinic clients, three clinic officers, and three clinic owners, 15 persons in total. Then, the data from the interview were analyzed to create the questionnaire. Step 2 was the quantitative research, using questionnaire and QFD technique to survey the needs of 400 clinic clients in Bangkok and perimeter area. The research results showed that there were five main factors which were the important service factors of small low-cost clinics in Bangkok and perimeter area. These factors consisted of 1. service factor in the queue management system 2. service factor in notification 3. site design factor 4. service factor in customer need patterns ,and 5. heath advice factor. Furthermore, the supplementary approaches of each factor were to employ the online system for providing services for clients to easily access physicians and service systems, and convenient to use services. In addition, another approach was not to invest in a lot of services, resulting in being able to survive in a highly competitive business.

Keywords: 1) QFD 2) Supplementary approaches in providing services 3) Small low-cost clinics

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Introduction

Thai society in Bangkok and perimeter areas now places a greater emphasis on healthcare. As a result, the private sector has developed a clinic business for service providers and people seeking treatment and maintaining good physical health. In addition, private clinics are important agencies in providing health promotion services, health consulting services to service recipients, patients and relatives. Private clinics will provide primary health care services to patients, so it is a must to have a history of service recipients as well as hospitals. Each patient will undergo a history record and a preliminary physical examination before undergoing laboratory testing, which will need to be followed up on the results of the treatment. Therefore, the health promotion field requires a lot of personnel involved (Rerksuppapho, 2011, pp. 145-159). However, the survey of clinics' service satisfaction found that some clinics provide slow and delayed services, unenthusiastic staff, no information about disease and proper practice, bad service and manner personnel, which cause dissatisfaction without getting good advice, etc. Therefore, the research team saw that the service or facilitating service providers is important and affects the satisfaction of the patients or service users in clinics (Kittinorarat and Nakornsri, 2017, pp. 39-50). In addition, the research team conducted a study a study on investment in small clinics, and found that the government's 20-year national strategy in the 12th National Health Development Plan and the 20-year plan of the Ministry of Public Health promoted the health service system by establishing family clinics and promoting the establishment of small private clinics to provide services in the network system in cooperation with host hospitals as a future direction and hope of reforming the health system of Thailand. However, from a study of investment in family clinics or small private clinics, it was found that the minimum cost was about 3-5 million baht, of which about 50 percent of the costs came from the cost of labor (Chiangcaisakulthai, 2019, pp. 175-187). Especially, the government wants small clinics to be distributed in various communities, so that people in the community can easily access health care. However, from the in-depth interviews of the research team with various clinics In Bangkok and perimeter area, it was found that people in Bangkok and perimeter area are different from people in communities in other provinces because of the high competition resulted from the large number of clinics in Bangkok and perimeter area. As a result, small clinics with investment costs less than 5 million cannot compete with medium and large clinics with investments ranging from 7-19 million baht (Chiangcaisakulthai, 2019, pp. 175-187.). Also, large private hospitals that have expanded the market to compete with community-level clinics due to the high competition in healthcare. Small and low-cost clinics have to adjust for business survival.

Therefore, the researchers focused on the study of the service design for small and low-cost clinics in Bangkok and perimeter area. The team applied Quality Function Deployment (QFD) technique to help improve the service quality. This technique turned the customers' requirements into the design service requirements of small and low cost

clinics. The researchers expected that the results of this research can be useful in improving services of small and low-cost clinics in Bangkok and perimeter area.

Literature Review

The House of Quality (HOQ) technique from a study of Sritong (2016) was defined as a tabular tool that shows the relationship between the voice of customer and "what" of customer desires, then weighs the importance of each customers' requirements. There are several ways to collect customers' feedback, such as filling out questionnaire, face-to-face interview, focus group interview, etc. After the process of evaluating customer's requirements, the voice of customer is interpreted as a technical requirement or Substitute Quality Characteristics (SQCs). House of quality (Chun-Yung-Chuang, 2009.)

Picture No.1 Picture name the elements of a House of Quality, the researcher must analyze and synthesize the elements in each aspect as follows.

a) The left wall (Customer Requirement) is what users expect from the product.

b) The right wall (Prioritize Customer Requirement) is the prioritization of users' requirements (planning matrix) divided into categories, such as user tests, ratings, points of sale, etc.

c) The ceiling (Technical Descriptors) or second floor is technical descriptor or voice of the organization that corresponds to the product in terms of specifications, design, engineering variables.

d) The room or house interior is expressing the relationship between customers' requirements and technical details, or simply interpreting the customers' requirements as a features and engineering specifications.

e) The roof (Interrelationship between technical descriptors) is showing the internal relationship between technical details, technical similarity and difference in established details.

f) The floor (Prioritized technical descriptors) or the foundation is technical details that are prioritized, for example, comparisons with competitors, difficulty rate, goal value.

Methods

1. Determination of details for design from a study of Sritong's Quality Function Deployment Technique Sritong (2015, pp. 13-23) is an integrated research with the following steps.

Step 1 of the study was to find out customer requirements. This qualitative research collected data by in-depth Focus Group Discussion with the selected the participants from clinics in Bangkok and perimeter area. The researchers selected clinics from the National Health Security Office, certified under the name "Warm Community Clinic" as they are small clinics with a network with large hospitals for patients to be delivered to in cases where clinics' treatment is not sufficient for patients' condition. In addition, the policy of the Warm Community Clinic is to support people apart from government hospitals where people in the community have access to services with convenient transport and without long time waiting. The interview from service users and stakeholders provided complete insights as

the researchers needed. From the selected 156 clinics in Bangkok and perimeter area, the researchers used a specific sampling to select 15 samples, including 3 physicians at the clinic, 6 clinic users, 3 operators and 3 clinic owners (Basic information of the Office of the Permanent Secretary Ministry of Health, 2013). The selection criteria for informants are as follows. 1. Clinical physician based in a small private clinic or a warm community clinic who has been working for at least 5 years as it is the time for informants to be able to recognize the advantages and disadvantages as well as changes in the clinic services, and compare the service model of clinic in different investment sizes. 2. Clinic user who has received clinical services from various clinics with different sizes of investment, and be able to provide analytical information of service model in terms of advantages and disadvantages of clinics in each size of investment. 3. Operator is employee who has been working in a small private clinic or a warm community clinic for at least 5 years, and be able to provide analytical information of service model in terms of advantages and disadvantages of clinics in each size of investment. 4. Clinic owner who has been an entrepreneur for at least 5 years, and be able to provide insights on the various costs of administration, as well as information on the advantages and limitations of clinical administration. In this assessment, all party made an agreement and contract not to publish any documents related to the cost of services due to the effect from the administrative cost provided by the entrepreneurs. On the other hand, the information on the service model of the clinic can be disseminated. Therefore, the interview design focused on information on the needs of the service users under the possible availability of small clinics' services, identified the customers' requirements, then gathered, grouped, and rearranged all requirements.

Step 2 was to adopt the concepts of Pinta and Kengphon (2003) as a guideline with integrated research steps. The customer's requirements or the customer's voice was arranged using a qualitative research tool called Affinity Diagram. The data was summarized by selecting only the requirements related to the service model, strengths and weaknesses, and was categorized in a format that can be applied in the questionnaire design to find a score of importance score for convenient application of the QFD technique. The study guide by Lasuka (2013) was applied as a guideline for creating a questionnaire.

Creating a questionnaire and testing the quality of the research tools were conducted by testing the Index of Item Objective Congruence (IOC) by 5 experts. The quality of the reliability of research tools was tested by trying out the modified questionnaire with 30 samples that are the same or close to the service users of the warm community clinics and not the same people who participated as the research sample. After that, the samples were simply selected to distribute the questionnaire.

Then, the information was prepared as a questionnaire used for quantitative research. At this stage, data from a group of clinical users was studied by assessing the importance of each requirement scores to survey their opinions on the service model of the clinic in

Bangkok and perimeter area. The size of the user group was determined from those of 156 clinics in the list of basic information of the Office of the Permanent Secretary for Public Health Ministry of Health in 2013, which were health service units in the warm community clinics with no bed to accommodate patients and unknown number of service recipients. Therefore, the researchers selected the population from the clinical service users based sizes according to Yamane's theory at 95 percent confidence level by using the exact values from the tables or using the formula for calculation as shown in Equation 1.

$$n = N/(1+Ne^2) \text{ ---------- } (1)$$

Where, n is the smallest acceptable sample size; N is the population; e is the acceptable error.

The questionnaire was prepared to determine the importance of various factors affecting the satisfaction of the survey respondents in terms of 4 aspects of services, namely 1. main service, 2. diagnostic results, 3. atmosphere, 4. supplementary service. The population group was unknown number of clinical users obtained from the sample randomization within the acceptable error rate of 5 percent. The sample size was not less than 385 people. The research team collected 400 people in order to obtain complete information and prevent data collection errors. Method of collecting data was Accidental Selection performed with clinic users in Bangkok and perimeter area by distributing the questionnaires to all 156 places, collecting 3 sets from each place, and selecting the completeness of the data obtained according to the number set by the researcher. The criteria for selecting the sample group were as follows.

1. Both male and female aged 15 years and older, because people aged 15 years and older can work and earn money according to labor law, which also can decide to choose clinic services.

2. Service recipients cooperate in answering the questionnaire.

For the data analysis, the requirements from the questionnaire were used to prepare the questionnaire to explore the level of importance of each demand factor in the questionnaire. In the questionnaire, there were 5 levels of importance and requirement scores. The definitions of the 5 score levels were defined as follows;

5 means the most important level.

4 means very important level.

3 means moderately important level.

2 means low important level.

1 means unimportant level.

Because the data from the questionnaire was from a selective scoring scale, the most reliable averaging method was to use the geometric average, where:

Average score of 4.21 – 5.00 means satisfaction of requirement at the highest level

Average score of 3.41 – 4.20 means satisfaction of requirement at a high level

Average score of 2.61 – 3.40 means satisfaction of requirement at a moderate level

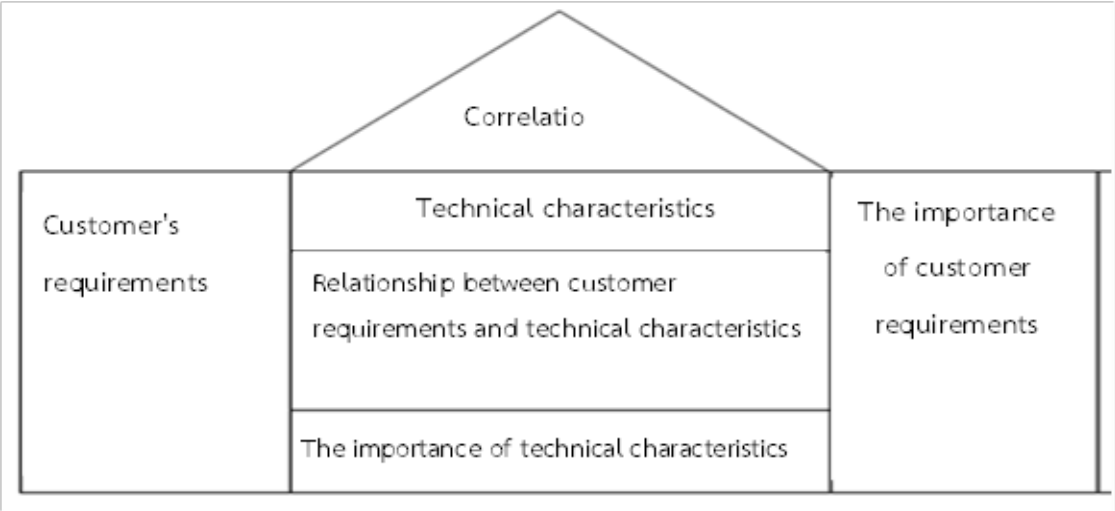
Average score of 1.81 – 2.60 means satisfaction of requirement at a low level

Average score of 1.00 – 1.80 means satisfaction of requirement at the least level.

To find the summarize average the obtained data from the questionnaire with selective rating scale, it was necessary to find

the Geometric mean for the most reliable result. The grometric mean could be obtained from the questionnaire, which would be used as an Important (IMP) value in product planning matrix or the House of Quality (HOQ).

For the analysis of qualitative function deployment technique, the QFD technique (Sritong, 2015, pp. 13-23) applied the analyzing tool named the House of Quality as shown in Picture No. 1.



Picture No. 1 Picture name House of Quality: HOQ (Sritong and Sritong, 2019, pp. 917-925.)

Creating a relationship matrix is the process of defining the relationship between service recipients' requirements and the representative of quality characteristics by scoring the relationship of requirement using numbers via performing a QFD (Turner and Carlson, 2003, pp. 163-171). This time, the research team set the relationship values as follows.

Given @ = high correlation (5), O = moderate correlation (3), X = low correlation (1). To find the correlation of the results obtained, the analysis in each matrix would be divided into requirements used in respond to import demand and the level of importance for each requirement. It showed that each requirement can be met with a level of importance as an indicator (Meemongkol, Junsong, and Santiamorntut, 2012, pp. 515-527)

Results

The results of the analysis of requirements of 15 informants, including 3 clinicians, 6 clinic users, 3 operators and 3 clinic owners, from in-depth Focus Group Discussion with the research team as the moderator, could be summarized the main points into 4 groups as follows. 1. Main service 2. Diagnostic results, 3. Atmosphere, 4. Supplementary service Details obtained from the summary of service user requirements could be separated in various aspects to create a questionnaire as shown in Table No. 1.

Table No. 1 Table name the details of the clinic users' requirements

Main services	Requirement for each inspection departments to be located closely to each other.	7.50
	Requirement to set a period of service time for all health checks.	7.25
	Requirement to be informed about the queue and the time required to wait for inspection in each department.	6.40
	Requirement to be informed and suggested a personally suitable health check-up course.	7.10
	Requirement for a consultation center to give advice after a health check / treatment.	7.85
	Requirement for employees with good manners and service mind.	8.04
Diagnostic results	Requirement for accurate results.	8.13
Atmosphere	Requirement for a clean atmosphere and smell	6.75
	Requirement for music / magazines prepared while waiting for inspection.	6.34
Additional services	Requirement for a dining room near the examination room.	3.44
	Requirement for a safe and private changing room.	4.10
	Requirement for an annual health check notification system.	5.05
	Requirement for a promotion for a family packaged health check	4.75
	Requirement for receiving health information from the center	4.75
	Requirement for drinks and snacks while waiting for an inspection	3.50

From the Table No. 1, the results obtained from the summary and weighting on the requirements of clinical service users from the experts found that service users paid attention to the accurate examination at a score of 8.13, followed by the good manner and service minded staff at a score of 8.04, and clinic's advice after health examination at a score of 7.85. According to the insights, it was found that the top 3 priority values are to build confidence among the service recipients both in terms of treatment and service. It is important for small-scale clinics to focus on these 3 areas of insights. By considering the insights, the researchers interpreted all requirements into broad requirement questions. Quantitative data and the average scores obtained from the data were collected and used for QFD analysis by analytical tool as a correlation table named the House of Quality.

For a broader survey and information, all requirements were used to determine the questionnaire to find the importance of each requirement. The sample was selected using the Turner and Carlson model (2003, pp. 163-171) for 400 sets from an unknown population group. The margin of acceptable error was

5 percent. The results of the service users' requirements were collected and analyzed to correlate with the limitations of the service model of the clinic. Then, each need was prioritized as shown in Table No. 3 showing the relationship between user requirements and the quality elements.

To create a relationship table, the vertical data is requirements obtained from conducting in-depth focus group interviews, while the horizontal data is derived from the summary of service constraints of the clinic operators that can respond to the service recipients. The weight of the scores entered in the table is from the focus group discussion jointly determined with the qualified experts.

Development direction of quality components			⇧		⇧	⇧	⇧	⇩		⇧	⇧	
Technology limitation / User needs		Importance of requirements (1-9)	Service model: Online queue system	Intelligent online health advice	Flexible respond to customer re	Online notification system	Flexible response to customer n	Confidence building in doctor	Friendly service	Design: Design and layout	Environmental, color and ventila	Communication devices, for exa
Main services	Requirement for each inspection d	5								@		O
	Requirement to set a period of serv	7.5	@									
	Requirement to be informed about t	7.5	@								O	
	Requirement to be informed and su	10		@				O				
	Requirement for a consultation cen	8.75		@							X	O
	Requirement for employees with go	8.75			@			O				O
Diagnostic results	Requirement for accurate results.	5		@					O			
Atmosphere	Requirement for a clean atmospher	11.3								O	@	
	Requirement for music / magazines	10										@
Additional services	Requirement for an annual health c	8.75				@						
	Requirement to promote a health cl	8.75							@			
	Requirement to receive health new	8.75				@				O		
The importance of quality components			60.8	42.6	29.6	54.7	47.8	104	29.4	48.2	36.2	67.9
Quality element weight			4.16	6	4.16	6.66	7.71	14.6	8.56	33.4	5.1	9.56

			Comparison							
		Designed clinical model	Company A	Company B	Company C	Planned quality	Increasing rate	Selling point	Absolute weight	Desired quality weight
Main services	Requirement for each inspection d	2	2	2	2	3	1.5	O	9	6.1
	Requirement to set a period of serv	6	4	4	5	7	1.2		8.8	5.9
	Requirement to be informed about t	5	4	4	7	7	1.4	O	13	8.5
	Requirement to be informed and su	4	7	5	5	6	1.5		15	10
	Requirement for a consultation cen	5	6	5	3	6	1.2	@	16	11
	Requirement for employees with go	5	3	4	4	5	1		8.8	5.9
Diagnostic results	Requirement for accurate results.	1	1	1	1	3	3	O	18	12
Atmosphere	Requirement for a clean atmospher	5	3	5	6	6	1.2	O	16	11
	Requirement for music / magazines	5	4	4	4	6	1.2	@	18	12
Additional services	Requirement for an annual health c	6	5	6	6	6	1		8.8	5.9
	Requirement to promote a health cl	6	5	6	5	6	1		8.8	5.9
	Requirement to receive health new	7	6	5	5	7	1		8.8	5.9

Picture No. 2 Picture name the relationship between user requirements and quality elements

From Picture No. 2 showing correlation between user requirements and quality elements, where @ = high correlation (5), O = moderate correlation (3), X = low correlation (1), there are 5 key factors in terms of design and service model of the clinic as follows.

1. A factor of queuing system – A service model should consider the arrangement of online queue system in order for customers to reserve queues in advance at a score of = 60.8.

2. A factor of notification service – A service model should have online and confidential appointment reminders and examination results at a score of = 54.7.

3. A factor of place design – Clinical space and layout design and management should consider the distance of customers, the area of the restroom, facilities, operating

and treatment rooms at a score of = 48.2.

4. A factor of service provision according to customers' requirements - Flexible service model to respond to customer requirements, for example the time of examination, installments payment for medical treatment, etc., is at a score of = 47.8.

5. A factor of health advice

Intelligent online health advice system by developing applications, for example providing basic health analysis system form individual results of examinations, and ability to contact the doctor directly regards a problem with health or examination results with preliminary online examinations, is at a score of = 42.6.

From the in-depth interview and the study of requirements through the mentioned correlation table, it is possible to propose 6 additional approaches for factors affecting services of small and low-cost clinics in Bangkok and perimeter area as follows.

1. A supplementary approach for queuing system management

The factor of queuing service system management found that, in clinics in Bangkok and perimeter area, patients currently sit and wait inside the small areas of clinics, which affects the transmission of some diseases that spread through the air, and causes discomfort for customers. This is consistent a study by Yokthaworn (2011) and Rattanaphan and Peerapat (2016, pp. 145-159), which emphasized the importance of queues that directly affect service design. Therefore, clinical practitioners should consider applying the online queuing service model that allows customers to reserve the queue in advance. Most users want convenience and speed of treatment, so there is the need to make an appointment in advance through the online system through an application on a mobile phone. Also, the service recipients can be outside of the clinic, while also being able to contact and check the queuing order for service. In addition, this method reduces the risk of infection with certain diseases transmitted through the air. Therefore, clinics in Bangkok and perimeter area should have an online system that can inform the queuing order for services with advance notification and function to contact the service users.

2. A supplementary approach for notification service

For the factor of online appointment and examination results notification, the researchers found that the findings of Rerksuppapho (2011, pp. 145-159) and Burgers JS. et al. (2003) are consistent with an emphasis on the notification system for service recipients. Due to the constraints of time and travel in Bangkok and perimeter area, most service users pay attention to making appointments and hearing examination results. Therefore, clinics should consider the online notification system in addition to phone call by clinical staff, for example sending personal messages on various online channel like LINE and Facebook. Also, after the notification of the examination results, the examinee should be able to inquire directly with the doctor on the date and time of the appointment via the online system in various formats.

3. A supplementary approach for place design

Designing and planning of clinical space management model should consider the distance of service recipients, areas of

restroom, facilities, operating and treatment rooms, in order to respond to the customer requirements and to be able to use the space effectively, for example, a clear separation between patients as most of the arrived service users have various symptoms. The results are consistent with a study of Yokthaworn (2011) and Rattanaphan and Peerapat (2016, pp. 135-150), which paid attention to the service areas because users are afraid of contracting other diseases from being together with other service users. Therefore, the supplementary approach for this factor is to consider the principles of space design and efficient use of space with clear space separation, as well as air ventilation.

4. A supplementary approach for service provision according to customers' requirements

The factor of flexible service that response to the requirements of customers is consistent with a study of Nakornsri (2018, pp. 297- 318.) who found that clinics must be flexible in various terms, for example, the service time for examination, installments payment for medical treatment, etc. Most clinics in Bangkok and perimeter area have a fixed and limited open and close service time, but the lifestyle of people in Bangkok and perimeter area cannot fit in to use the service in the period of time. Therefore, users have a need for flexibility in using services, such as reservation for out-of-hours examinations similar to hospitals that offer 24 hours a day of service for treatment, and many forms of payment for medical services, for example installments.

5. A supplementary approach for health advice

Intelligent online health advice system should be developed as applications, for example, providing basic health analysis system form individual results of examinations, and ability to contact the doctor directly regards a problem with health or examination results with preliminary online examinations. The research result is consistent with statement by Kittinorarat and Nakornsri (2017, pp. 39-50) in terms of concrete service quality. It is also in line with a result of Damkrut (2016) in terms of being aware of service quality of response. In addition, it was found that there are customer requirements for preliminary medical consultation without having to come to the clinic for an examination by receiving an online examination. Thus, clinics should create a distinctive point of service by providing an intelligent online health advice.

6. A supplementary approach for clinical fundamentals

From the in-depth interviews with experts, it was found that they had given importance to the basic factors of clinical service as follow. 1. Accurate and reliable examination results 2. Service minded staffs 3. Building trust among clients by providing useful explanations and information after treatment or services. 4. From the quantitative data, the fundamental factor with the highest score were WiFi service, because people's lifestyles today have changed to paying attention to and using mobile phone with internet connection. As a result, the basic factor of service of every clinic is having WiFi service, which will respond to the users' requirements.

Conclusion and Discussion

The study of researchers with procedures searching for user requirements is consistent with a research by Yokthaworn (2011), which resulted in responding to the needs of service users. The results of the study revealed that, for small clinics to survive the current economic climate and compete with larger clinics, the following factors must be considered:

1. Queuing service management factor
2. Notification service factor
3. Place design factor
4. Service provision according to customers' requirements
5 Health advice factors

The factors found by the researchers are consistent with the study by Rerksuppapho (2011) about the satisfaction of service users in health promotion clinics, Her Royal Highness Princess Maha Chakri Sirindhorn Medical Center Hospital, which found that the overall satisfaction is for the services and facilities within the clinic. Therefore, the clinic improvement should be focusing on the design of modern service and the plan for flexible place and facility to be adjustable according to the user number. In addition to the factors, there are very important fundamental factors for every clinic, including correct treatment system without any error, service minded personnel, and provision of important and useful information for service recipients after the health check or services. Also, in addition to providing basic services, the researchers found that the finding is consistent with the study by Rattanaphan and Peerapat (2016) showing that queuing is a clinical problem. Thus, the researchers proposed a solution to ease the queuing issue. Also, Rattanaphan and Peerapat (2016) proposed the application of new technologies to services, which is in the same direction with the researchers' results. The researchers also found that the service that every clinic must provide is WiFi, which is a customer's need.

According to the researchers' study, it was found that the current situation of clinics in Bangkok and perimeter area has a high competitiveness with high investment required. As a result, entrepreneurs in many places experience losses and shutting down. Therefore, in order for small clinics with low cost of services to survive in this highly competitive situation, entrepreneurs need to be able to adapt by applying the approaches from this research result to improve service provision. The factors and supplementary approaches proposed by the researchers require a low investment budget, while yields several times higher returns. Many approaches are based on the application of current technology to services, which is easily accessible to service providers. As a result, small and low-cost clinics can have a selling point, create a competitive advantage, and survive from the current situation.

Research Suggestions

1. This research was conducted only with small clinics in Bangkok and perimeter area, which has not yet included all provinces in the central region and other regions of Thailand. Therefore, to complete the research, further study should fully explore all provinces.

2. This research collected information from only small clinics. Therefore, further study can find out more in-depth information, for example separation between medium-sized clinics and small-size clinics to compare the overall factors.

3. This research can be further researched in terms of clinical management affecting different services, such as specialized clinics or beauty clinic, etc.

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