

2018 Assigned Research Report

**" Mobile Broadband Service Quality Specification Evaluation  
Mechanism Research Plan Project"**

(Project No.: NCCJ107-04)

Briefing Report (English Version)



**Assigned party: National Communications Commission**

**Executing party: Telecom Technology Center**

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## **Abstract**

Through the guide of the National Communications Commission (NCC) and the great effort made by all the operators, the number of subscribers grows up quickly. The operators continue to promote mobile broadband services by diverse service packages for the consumers. To ensure the quality of services (QoS) experienced by the subscribers becomes one of the most concerned topics. The QoS of mobile broadband Specification including four different kind category as like service performance, customer service center, customer complaints processing and billing service, totally of 25 indicators was published on April of 2018 by NCC for realizing "Regulations for Administration of Mobile Broadband Businesses" and protect the interests of consumers.

Therefore, the project will refer to the relevant norms and guidelines for the experience quality of mobile communication user terminal services in the United Kingdom, Australia, Singapore, the United States and Japan, then to formulate an evaluation mechanism for QoS of mobile broadband in the guide with our situation. NCC can claim all the operators of mobile broadband to keep improving their subscriber's service quality based on that. At the same time, with proper disclosure, the evaluation results can also serve as a reference for consumers to choose mobile operators.

The QoS of mobile broadband assessment as above mentioned can be carried out by the operator self-assessment periodically or by the third impartial authority. The disclosure of relevant information serves as a reference for consumers to choose the most suitable mobile operator. This will increase the QoS of mobile broadband services and implement consumer protection mechanisms.

**Keywords:** Mobile Broadband, Customer Quality of Service, Service Efficacy, Customer Service Center, Customer Complaint Processing, Billing Service.

## **Chapter 1: Project Origin and Literature Review**

In this study project, we've collected and studied the practices from major advanced countries, studied and rise up the mobile broadband service quality specification evaluation mechanism information, standard operating procedure (SOP) and evaluation report templates cooperative to the national conditions, used as the referenced accordance that NCC takes to ask the mobile broadband operators to consistently improve their quality of service (QoS). Meanwhile, this assessment result can also be used as a reference for consumers choosing mobile broadband operators by appropriate disclosing methods.

## **Chapter 2: Research Method and Plan Architecture**

The plan architecture of performing this research project is shown in Figure 1. We performed the research and analysis of customer service quality in the operation of mobile broadband system and the system performance service quality indicators of network, collecting the norms and rules of end user service experience and quality on mobile communication from Europe, America, Oceania and Asia, including the UK, Australia, Singapore, USA and Japan, and data disclosed items and respective definitions and practices, analyzing the advantages and disadvantages and compare them with the service quality specifications of local mobile communication services; by the works involved from literature analysis, experts interview and field investigation, we obtain the research result and the parameters referred to the service quality indicators of International Telecommunication Union and other relevant organizations; follow the "Key points of Implementation for Mobile Broadband Business Service Quality Specification" to plan for the Mobile Broadband Service Quality Specification Evaluation Mechanism that meets domestic characteristics. Meanwhile, through proper disclosing method, this research result is to be the reference for policy supervision and consumer service.

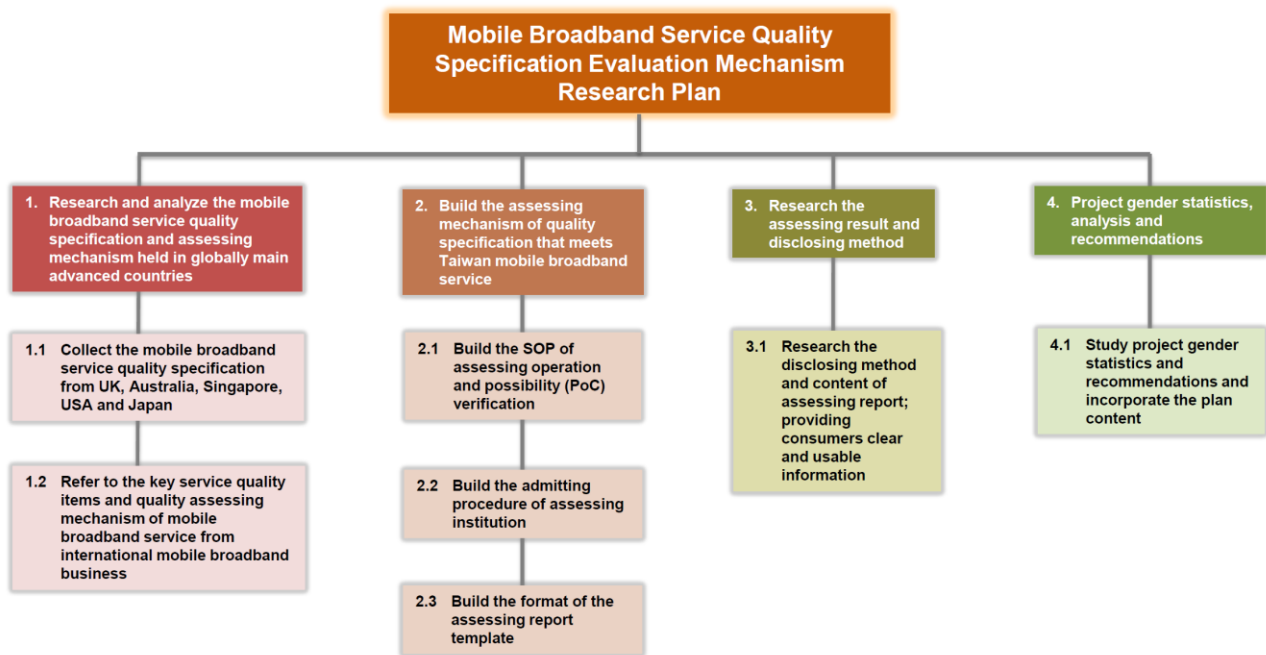


Figure 1: Plan Architecture Diagram  
(Data Source: Edited from this Report)

### **Chapter 3: Research and analyze the norms and evaluation mechanism of mobile broadband service quality made in major advanced countries worldwide**

Research and analyze the norms and evaluation mechanism of mobile broadband service quality performed in globally major advanced countries that include the UK, Australia, Singapore, USA and Japan. For the service quality norms, in the scope of sales service, public warning system, consumer protection and network efficacy, the Ofcom in UK, ACMA in Australia, IMDA in Singapore, CTIA in USA and Japan Ministry of Internal Affairs and Communications, ask their respective local mobile operators to provide customer service items based on their telecommunication acts; build related telecommunication regulations by considering the local operating conditions and using scenarios; ask the respective domestic mobile operators to follow up. This research report follows the service quality indicators proposed by the International Telecommunication Union (ITU), ITU-T E.802 mobile telecommunications service performance model and respective local customer service indicators, making the cross-check with Taiwan "Key points of Implementation for Mobile Broadband Business Service Quality Specification".

For the service quality assessment mechanism, from varied local conditions, the customer service efficacy mainly contains the customer complaint and bill processing, whereas the network service efficiency mainly includes the disclosing assessment of radio wave coverage map, network service coverage and network availability requirement; we compile and compare the implementing norm of domestic "Key points of Implementation for Mobile Broadband Business Service Quality Specification" against international ones.

Regarding the unlimited internet tariff and related services, at present, international supervisory competent authorities have no standard on them, and mainly have the mobile operators provide the service contract management on the mobile data capacity according to the rates and the combinations of different products and services.

## **Chapter 4: Build the assessing mechanism that meets Taiwan mobile broadband service quality specification**

The assessment stipulated in this research project bases on the 25 disclosed items specified in "Key Points of Implementation for Mobile Broadband Business Service Quality Specification" announced by NCC, which consider the standard implementing environment and practical performing aspect of service assessment, perform the case scenario planning and design the standard operating procedures (SOP), divided into the Field Test, Site Service Check and Evidence Check categories.

1. Field Test: The appraisers try to operate the equipment under the condition of not affecting the environment; complete the evaluation test and record the test result.
2. Site Service Check: The appraisers try to conduct on-site interview or observe the service quality of customer service personnel and record the check content, in the purchasing service operator's role.
3. Evidence Check: Any evidence that the appraisers provide the acquired information (such as the service contracts or instructions, etc.) through the operator service website (official website) or other ways, which can support the fact that operator's service quality meets the one specified in the "Key points of Implementation for Mobile Broadband Service Quality Specification", can be included in the evaluation record.

The sampling method applies the stratified random sampling method, the sampling main body is stratified according to the mobile operator, and the required number of samples is randomly extracted from each layer. Under the 95% confidence level, the total sampling error is controlled within  $\pm 3.00\%$ , which is adopted to confirm the stability and reliability of the evaluation method. The sample survey uses the "Online Questionnaire" as the survey method; sampling objects are people in Taiwan who have "4G mobile broadband Internet service"; using the "SurveyCake" questionnaire survey website as the platform of dispatching the questionnaires and collecting the respective service satisfaction survey data. Use the "stratified quota sampling method" to analyze the result of service quality satisfaction, and then evaluate the services of various mobile operators. The 25 items of service quality questions that cover four categories are evaluated by the "Likert scale", which quantifies the satisfaction of service quality into five scores. The higher score represents better customer satisfaction to the service offered; on the contrary, the lower score represents worse customer satisfaction to the service. The sampling score of questionnaire applies the "Fixed Weighted summary". The scores corresponding to each of the questions are calculated as shown in Table 1.

The total score of the questionnaire is divided by the number of questions, that is:

$$\text{Questionnaire Score} = \frac{\text{Questionnaire Score}}{\text{Number of Questions}} = \frac{100 \text{ Points}}{25 \text{ Questions}} = 4 \text{ Points/per Question}$$

Table 1: Calculation of score on the questioned item

Questioned Item	Score
Excellence	4 Points
Good	3.2 Points
Normal	2.4 Points
Fair	1.6 Points
Bad	0.8 Points

(Data Source: Edited from this Report)

By considering the professional neutrality, objectivity and conditions of the assigned assessment institution, basically, the assessment institution should be the public or academic research institution and legally established company (including engineering and technology consulting company) having the experience of implementing large-scale assessment project of mobile network rate, long-term study 4G mobile network and hold related efficacy indicators and technical capability, and the experienced legal entity or academic institution or legally registered company able to provide research or performance with sufficient skills in the industrial environment of telecommunication and assessment field.

The selection of assessment institution includes the selecting operation of tender assessment institution and review of application qualification on it; for the selecting process of assessment institution, we recommend building the respective committee organized by external experts, scholars and others relevant. The selection of assessment institution includes the selecting operation of tender assessment institution and review of application qualification on it.

The format design of assessment report template includes four aspects: "Service Efficacy", "Customer Service Center", "Customer Complaint Processing" and "Billing Service", which are subdivided into 25 indicators as shown in Table 2; use the assessment of multiple service quality indicators to disclose the assessing report information and achieve the goal of improving the overall service quality of mobile broadband. When the assessment result shows it fails to meet the planned one, vendor should one-by-one improve the items under service quality assessment, use the remarks and replenishing review mechanism to apply for the replenishing operation by replenished information. If the replenished supporting information meets the target specified in the "Key points of Implementation for Mobile Broadband Service Quality Specification", vendor can win the respective score points, otherwise, the item is listed as nonconformity one and becomes the key auditing item in the next assessment.

The operating procedure of mobile broadband service quality assessment follows the related assessing procedure to proceed, including the consumer questionnaire and site survey of service quality and recording of the assessing result; use it to understand vendor's implementing status of service quality.



Table 2: Recommended Assessment Template Format and Disclosing Method

Assessed vendor: \_\_\_\_\_

Assessing Category	Disclosing Item of Service Quality	Consumer Grading Score	Site Grading Score
Service Efficacy	Service Providing Schedule: Within two hours from outlets-receiving the application to service provided (excl. Mobile Number Portability)	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Provide Free Trial of Mobile Internet: Prior to providing client's mobile online service, offer 7-day or longer trial service.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Traffic-exceeding notice of mobile Internet data usage: When client uses the non-unlimited service, actively notify client that the total mobile online data usage exceeds 70%~85% of the dealing one by short message or other proper method.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	International Data Roaming Charge Alert: When client is abroad to enter the international roaming mode, make at least one alert before the charge reaches NTD 5,000; and make one more alert when reaching NTD 5,000.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Radio Wave Coverage Disclosure: Announce the outdoor service covering range on sales outlets and website.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Wireless Internet Data Download Rate Disclosure: Announce on sales outlets and website that the mobile-operator's self-assessed wireless online data download rate exceeds 2Mbps.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	International Data Roaming Service: The International Data Roaming service is defaulted to close, which can be opened after client's application	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	International Roaming Care Short Message Service: When client enters the International Data Roaming mode, mobile operator sends the respective care short message reminding client the notice matter.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)

Assessing Category	Disclosing Item of Service Quality	Consumer Grading Score	Site Grading Score
Service Efficacy	Total Customers Disclosure: Link to NCC website that announces the total client amount from the official website of mobile operator.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Public Warning System (PWS) Service: Regularly provide PWS service per month, Cell Broadcast Center (CBC) and Cell Broadcast Entity (CBE) remote backup test per six months and the specific Public Warning System website for the public's query.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Sufficiently disclose the SIM card pin unlock information; enable clients to unlock their mobile service smoothly.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
Customer Service Center	Customer service response time: The time from connecting client's service hotline call to responding it is within 35 sec.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Provide free customer hotline service: Provide toll-free customer service hotline to customers.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
Customer Complaint Processing	Time Limit for Contact Customer after Customer Complaint: Mobile operator should respond customer's written complaint in writing within 15 days since receiving the complaint.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Multiple Customer Complaints Service Channels: Specifically mark the customer-complaint channels provided and using method.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Number and Type of Customer Complaints: Announce the total customer-complaint amount per month, season and year by linking to NCC consumer complaint supervision report from the official website of mobile operator.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
Billing Service	Billing Accuracy: Reach 99.85%.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)

	Offer-expired Notice: Mobile operator should notify client about the due of promotion discount taken by short message and bill within three months before the respective due date.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Bill Indicates the Data Usage: The bill should indicate the monthly data usage on it.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Notice of Flow or Traffic Abnormity: Actively notify client about the conditions that are possibly to make bill abnormity.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Credit Advice after Payment: Mobile operator should actively provide the receipt on the cost deposited by client or notice of payment received.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Description of Various Charges and Value Added Services: Provide the description of various charges and added services; for example: The charge way of Voice over LTE (VoLTE) and description of communication details, etc.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Voice and Mobile Internet Tariff Trial Calculation: Provide voice and mobile internet tariff trial calculation on company website or Apps (Applications).	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Personal Data Protection Policy and Certification: The personal data protection policy and certification and related certificates on official website or by public declaration.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Proceeding Method of Customers not Applied Service Charge: Do not charge any service not applied by client.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
	Proceeding Method of Free Trial Service Charge: Do not charge the free-trial services during the trial period declared by mobile operator.	<input type="checkbox"/> Points/ 4 Points	<input type="checkbox"/> Point/Meet <input type="checkbox"/> Not meet/ (Remark)
Assessing period: From __/__/__ to __/__/__ (specified by NCC).			

(Data Source: Edited from this Report)

Base on the framework of Australia communication service quality information, plan for the extended information history of mobile broadband service quality in Taiwan, shown in Figure 2; the service items may appear at different stages and priorities; the importance of detailed service information at different stages can be displayed by the client service information framework history of mobile broadband.

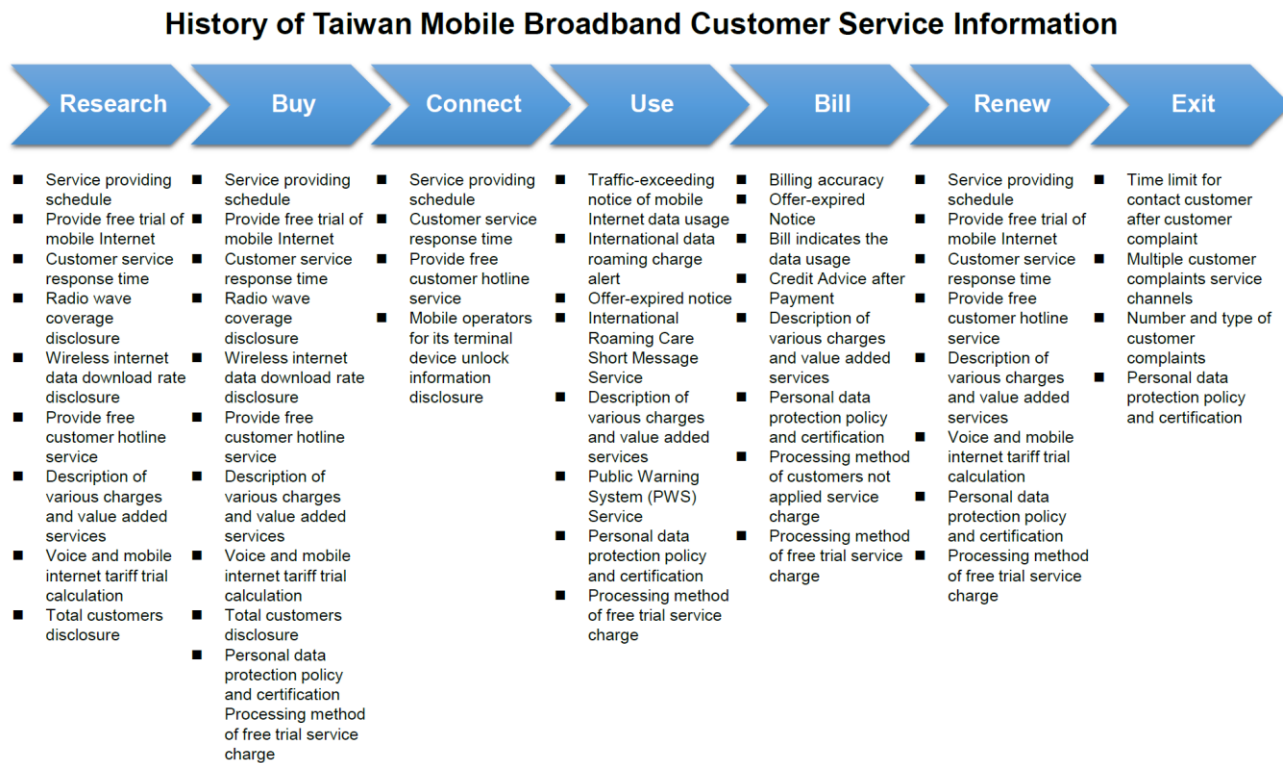


Figure 2: History of service information on mobile broadband clients in Taiwan  
(Data source: Edited from this Report)

## **Chapter 5: Visiting interviews of experts and scholars**

In order to make this project successful and realize the opinions to the quality evaluation mechanism of mobile broadband service from information/communication experts and scholars, field experts and consumer groups, held two expert interviews to consult their opinions. First, the information/communication experts and scholars have positively agreed the fact that the announcement of "Key points of Implementation for Mobile Broadband Service Quality Specification" is helpful in promoting domestic telecommunication services and obtaining good service competition. Except assigning the assessment task to the third party, it also allows the vendors to perform self-assessment themselves. We suggest inviting the manufacturers, authorities and scholars building the Evaluation Working Group that regularly inspects the adequacy of service indicators; and include the enterprise's social responsibility indicators to encourage vendors fulfilling their social responsibility properly. Second, according to the opinion from field experts, we presently fulfill the task of asking mobile operators following NCC requirement to fully disclose the information of technical indicators specified in "Key points of Implementation for Mobile Broadband Service Quality Specification" on the official websites and sales outlets of mobile operators. In addition, the "Key points of Implementation for Mobile Broadband Service Quality Specification" has been built after many discussions; the present indicators are pretty concrete in all aspects; we don't recommend to add the indicators. For the evaluation operation, we suggest following the present indicators and having vendors to make self-assessment; and review if there is necessary to make another adjustment. For the assessment operation, we hope to make the step-by-step way; prior to assessing operation, it should invite vendors to participate in the discussion and make them to confirm the result before announcement, which will grant vendors the opportunity to appeal about. Moreover, from the opinion of consumer groups, mobile broadband service quality should follow the assessing result to strategize vendor's services; the competent authority should urge the mobile operators to provide relative information to the public. Besides, the mobile broadband service quality indicators should take rolling modification matter under regular inspection, with different weights thereof. The assessment of service quality on mobile broadband should assign the fair third party performing it. Prior to performing assessment, it should hold the vendors briefing to explain the assessing method and operation of grade calculation and disclosure of assessing result. The assessing result should be announced.

## Chapter 6: Statistical analysis of assessment on possibility of coverage (PoC) on Taiwan mobile broadband service signals sampling verification operation and sampling survey of service quality and gender equity

The mobile broadband service network coverage sampling includes fixed-point and mobile statuses. By our analysis, except for the offshore islands that the measurement data of fixed-point unlimited Internet online is slightly lower than other regions, in which the average download rate is still up to 45.899 Mbps, the highest average download rates for others are, in turn, the rural, central, northern and southern regions, as shown in Figure 3; the average download rate of all regions excluding rural one is 54.455 Mbps. Measurement rate data of non-unlimited internet rate plan for fixed-point in all regions is shown in Figure 4; all regions are not exceeding 0.119Mbps.

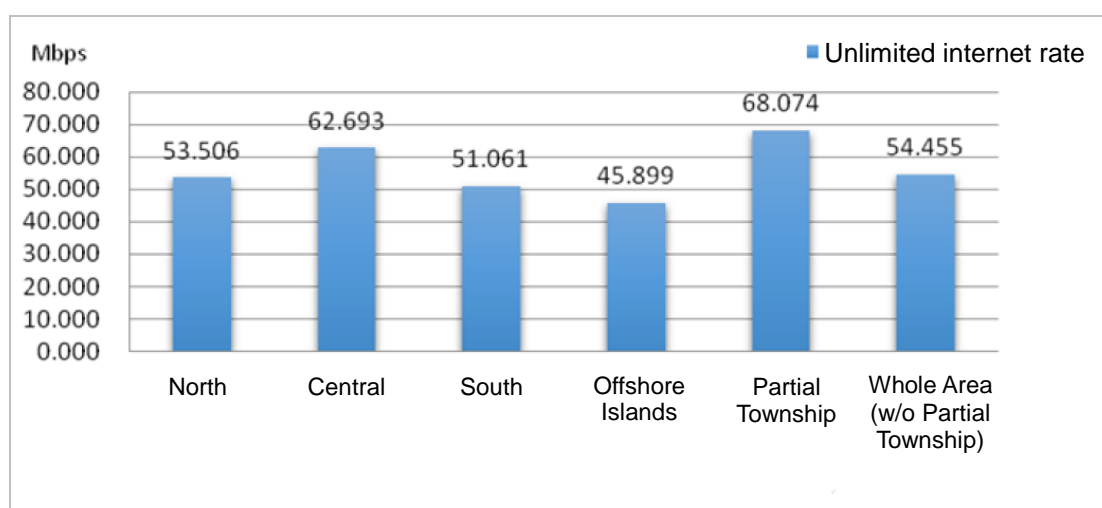


Figure 3: Measurement Rate Average of Unlimited Internet Rate Plan for Fixed-point in All Regions  
(Data source: Edited from this Report)

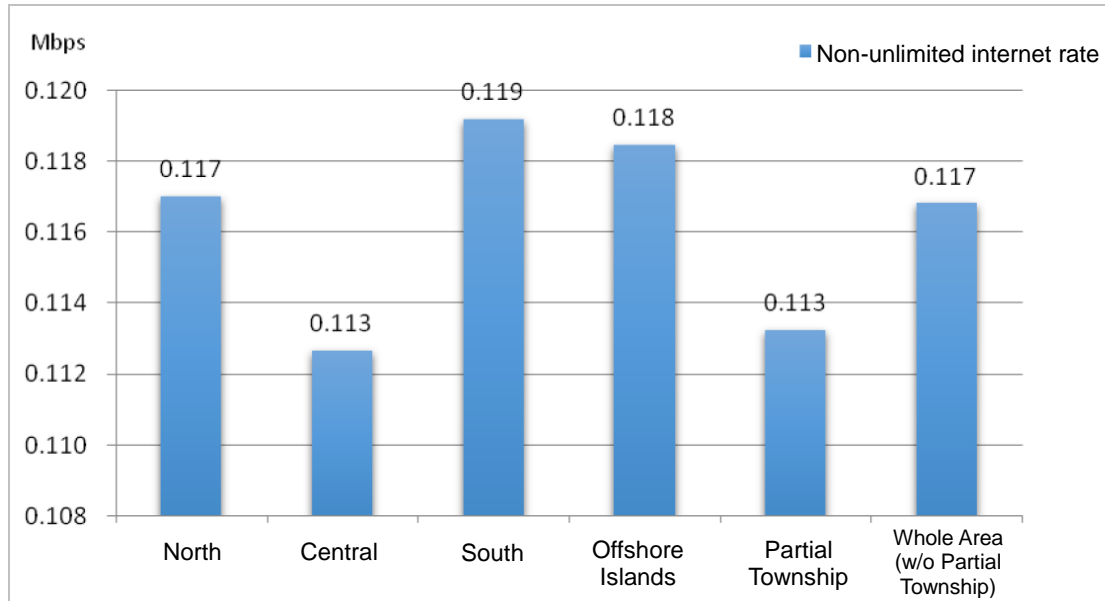


Figure 4: Measurement Rate Average of Non-unlimited Internet Rate Plan for Fixed-point in All Regions

(Data source: Edited from this Report)

The average download rate of mobile measurement unlimited internet plan is shown in Figure 5; the highest one is at Kaohsiung MRT, which is 76.76Mbps; the lowest one is at Xinyi Expressway, which is 47.63Mbps. The average download rate of mobile measurement non-unlimited internet plan is shown in Figure 6; the highest one is at highway, which is 0.1204Mbps; the lowest one is at Kaohsiung MRT, which is 0.116Mbps.

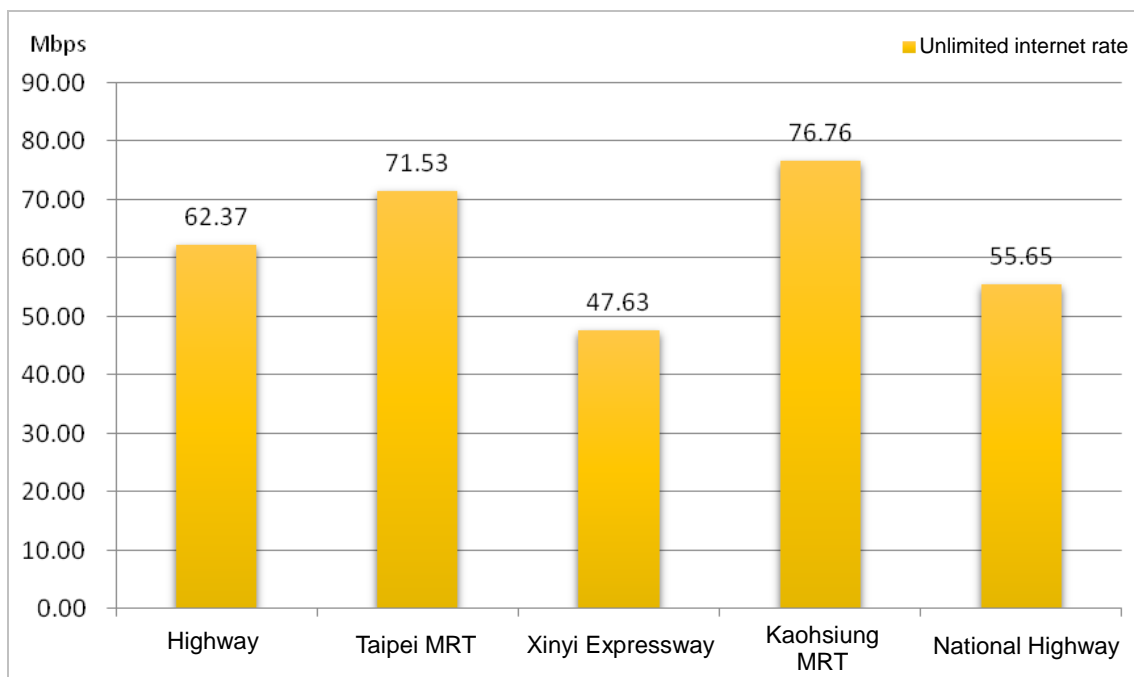


Figure 5: Mobile Measurement - Measurement rate average of mobile unlimited internet plan  
(Data source: Edited from this Report)

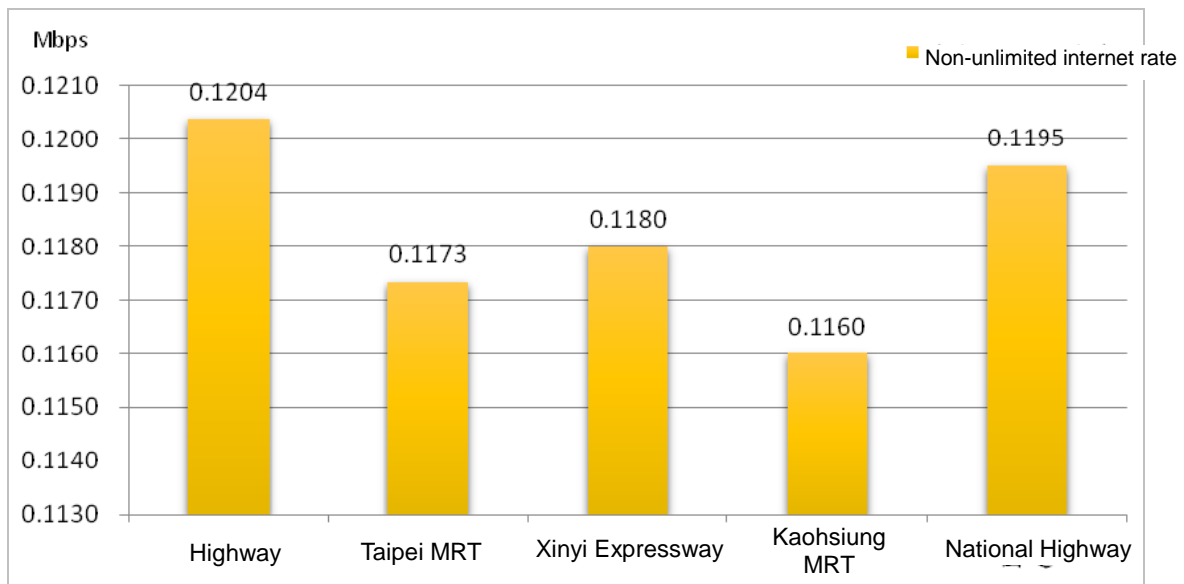


Figure 6: Mobile Measurement- Measurement rate average of mobile non-unlimited internet plan  
(Data source: Edited from this Report)

In order to verify the (PoC) of mechanism, this research project uses 11 service indicators in Taipei City, New Taipei City, Taoyuan City, Taichung City, Tainan City and Kaohsiung City, we pick 10 direct sales outlets of mobile operator making site service quality possibility (PoC) assessment operation, the analysis result of site service verification shows that all of the 10 direct sales outlets meet the targets of service indicators. The web sampling questionnaire survey has 1,445 valid samples; from our analysis, the service satisfaction grades of all mobile operators on the four categories are above the average values. From Table 3, the satisfaction grades of top five domestic mobile operators gain better grades on the Service Efficacy, Customer Quality of Service and Billing Service. For the Customer Complaint Processing aspect, although the customer complaint issue is difficult to grasp, it still is above the average level judged by consumers.

Table 1: The satisfaction grades of nationwide mobile operators on the four aspects

Four Aspects	Average Scores of Each of the Aspects
Service Efficacy	2.75
Customer Quality of Service	2.82
Customer Complaint Processing	2.63
Billing Service	2.87

(Data source: Edited from this Report)



## **Chapter 7: Conclusion and Suggestion**

1. The conclusion and future suggestion of this research project are illustrated in below:

1) Research and Analysis of International Mobile Broadband Service Quality Specification

To facilitate Taiwan mobile broadband service quality standardization policy being synchronized with the global one. Collect and analyze the norms and evaluation mechanism of mobile broadband service quality and unlimited internet tariff from major advanced countries (UK, Australia, Singapore, USA and Japan) to realize the practice made thereof, stipulated as follows. First, in term of service quality specification, the UK's Ofcom customer service quality conditions include emergency call numbers, minimum requirements for service contract, information transparency and disclosure, charge and bill processing, detailed bill, implementation specification and dispute dealing, call number portable service and service quality, etc. Australia's TCP standard includes sales, service and contract, settlement, credit and debt management, change telecommunications operator and complaint proceeding; The new-added items of credit and debt management have increased the protection of domestic violence victims against credit and debt management objects. Singapore's service quality content of mobile communication efficacy and telecommunication service competition practice guidelines set the general and mandatory responsibility requirements to mobile operators. US CTIA specifies that the service rate and terms should be disclosed to customers, the service scope should be presented on the map, provide the contract terms to customers and confirm the service changes, and allow for the trial period of the new services, provide specific disclosures on advertisements, separately identify charges and taxes on the bills, provide customer terminal service and right of contract change, provide timely service to customer, promptly respond to consumer inquiries and complaints received from government agencies, strictly follow customer privacy, and free service usage warnings, mobile wireless device unlocking. Japan specifies the [Notes to Consumer Protection Specification] in the Electrical Communication codes, which mainly specifies the service provision announcement, service information description, customer complaint proceeding and disaster and evacuation warnings in the Public Warning System that can be used freely, and privacy protection measures including communication secret, content, number, time and billing information. Next, in term of service quality evaluation mechanism, the overall satisfaction of UK's Ofcom service includes the Customer Complaint Processing, customer complaint recording management and statistical analysis, and bill processing. The Service Efficacy includes network availability such as signal coverage,

Internet access rate and blocking status. The network efficacy can be measured by various technologies, such as speed measurement APP or professional network measurement equipment, used to verify road coverage or efficacy. The customer service emphasizes on consumers' contact and interaction experience and whether it can effectively solve customer complaints or not? Australia AMTA has established the telecommunication industry ombudsman (TIO) to make the service quality of customer complaints channel more perfect; telecom operator submits the customer complaint reports to TIO once per every three months for TIO to analyze, report and announce the related customer service commitments on website. For the radio wave coverage disclosure in network efficacy, Singapore's QoS Standards for 4G Services responsibility asks that the existing and new service providers must have 85% ~ 95% service coverage rate in outdoor, indoor and tunnel, monthly monitor the coverage percentage and publish it quarterly. For the network availability, Singapore government requires more than 99% coverage since July 1, 2017. The US FCC applies open Internet transparency rules asking mobile broadband providers to provide consumers with sufficient broadband service information, including speed and price selection, monitoring mobile broadband providers to disclose broadband speed and price to consumers. Japan Ministry of Internal Affairs and Communications sets up a research team that objectively evaluates the effective speeds and measurement methods of various operators' mobile networks; builds the measurement mechanism, including the setting conditions and items and implementing process, and finally provides relevant reports to users. The measuring result is published on respective mobile operator's website to disclosure it. Furthermore, in term of unlimited internet tariffs and related services, the supervisory authorities of various countries have no standard requirements at this stage; the speed and service contract management are mainly carried out by mobile operators. UK mobile operators will control the download rate at different time points. There is no unlimited Internet access solution for all Australian mobile operators; the highest network data transmission plan is 20GB ~ 120GB per month. There is no unlimited Internet access solution in Singapore. The highest network data transmission plan is 12GB~33GB per month. The StarHub mobile launches the unlimited data transmission service during weekend. All mobile operators in the United States have the respective unlimited Internet access plans, but the mobile operators reserve the right to slow down users' Internet online speed after they have consumed certain data transmission (22 GB) within a month. Japan does not have unlimited Internet access, the network ceiling transmission is mainly 30GB (occasionally launched 50GB plan), the DTI SIM launched an unlimited data transmission plan, but in fact there are additional restrictions, such as when the data transmission within 48 hours is over 3GB, data transmission speed will be limited.

## 2) Design of service quality evaluation operation procedure and proof of concept

This research project totally completed 26 evaluation procedures; in order to verify the possibility (PoC) of mechanism, use 11 of the service indicators in six cities (Taipei City, New Taipei City, Taoyuan City, Taichung City, Tainan City and Kaohsiung City) and 10 direct sales outlets to conduct PoC assessment operation of site service quality. The analyzing result is as follows: (1) Service providing schedule: All operators have completed the tasks within two hours. (2) Time limit for contact customer after customer complaint: All complaints are responded within 15 days by emails. (3) Radio wave coverage disclosure: All of the operators' official websites can be inquired; and the sales outlets also have announced it. (4) Disclosure of wireless internet data download rate: All of the operators' official websites can be inquired; and the sales outlets also have announced it. (5) Number and type of customer complaints: It is recommended that the operator's official website sets up a link to NCC to announce information. (6) Bill indicates the data usage: The amount of data usage is clearly stated in the bills. (7) Description of various charges and value added services: The sales outlets will provide a description of the tariffs according to the applicable tariffs; the official website of operator also provides information on the details of charges. (8) Voice and mobile internet tariff trial calculation: The official website provides consumer tariff trial calculation; Apps only provide customers the trial charge calculation based on historical usage status; new client making application at the sales outlets can only obtain the charge recommendation per consumer habit. (9) Total customers disclosure: It is recommended that all mobile operators set up a link to NCC to announce information. (10) Personal data protection policy and certification: All mobile operators have proper protection on personal data. (11) For the proceeding method of free trial service charge, mobile operators use different tariff plans to cooperate with the respective free trial services; no charge is made during the trial period.

### 3) Accrediting method and procedure of assessment institution

Consider the professional neutrality of assessment institution. Basically, the conditions of assigned assessment institution should be the public corporation or academic institution or registered company (including the engineering consultants company) having the experience of implementing large-scale assessment project of mobile network rate, long-term study 4G mobile network and hold related efficacy indicators and technical capability, and the experienced legal entity or academic institution or legally registered company able to provide research or performance with sufficient skills in the industrial environment of telecommunication and assessment field; for the selecting process of assessment institution, we recommend building the respective committee organized by external experts, scholars and others relevant. Conduct the qualification assessment and selecting operation through the tendering of assessing institution selecting channel or the review and selection of qualified assessing institution.

### 4) Disclosure of assessing report template and information

The format of the assessing report template includes the assessing basis, purpose and object; the assessing method and standard and the presentation of assessing process should meet the spirit of "Key points of Implementation for Mobile Broadband Business Service Quality Specification"; categorizing the disclosing of service quality information for mobile broadband into four major aspects: Service Efficacy, Customer Quality of Service, Customer Complaint Processing and Billing Service, which are subdivided into 25 indicators. The goal is to promote the service quality of mobile broadband services, enable mobile broadband operators to implement the disclosing of relevant service items and conditions, meet the purpose of elevating mobile broadband service quality and fulfilling consumer protection mechanism.

### 5) Satisfactory grade analysis of service quality on the four aspects

From the questionnaire survey of nationwide mobile broadband service quality, the five main domestic mobile operators identically have better grading on the Service Efficacy, Customer Quality of Service and Billing Service aspects. For the Customer Complaint Processing aspect, although it still is above the average level, yet, the customer complaint issue is difficult to grasp, and relatively easy to cause consumers to complain about. According to NCC analysis report on consuming complaints/appeals (NCC, 2018), the appeals of mobile communication focus on the online quality, application/altering/contract extension, customer service, liquidated damages and charge issues; overall speaking, the customer complaints mostly are caused

from the gap between consumer expectation and actual one provided by mobile operators that impacts the service grading result. To reduce the appealing amount, in the future, on the Service Efficacy aspect, we suggest that mobile operators should, interiorly, reinforce the training of customer service staff on question reflection/judgement and reason analysis of appealing cases and respective solution-making countermeasures; exteriorly, consistently drive the image of enterprise's social responsibility and enhance the service propaganda and make service information transparent. Get consumer's confidence to the telecommunication market by reducing the complaint amount from consumers.

#### 6) Visiting interviews analysis of experts and scholars

Opinions of information/communication experts and scholars, field experts and consumer groups on the technical, management, executing and policy aspects in the service quality assessing mechanism of mobile broadband are illustrated in below.

##### (1) Information/communication experts and scholars

Positively confirm that the announcing of "Key points of Implementation for Mobile Broadband Business Service Quality Specification" is helpful in promoting domestic telecommunication service quality and meeting healthy service competition. Except assigning the assessing operation to third party in a fair way, also open to companies making self-assessment. Suggest inviting the manufacturing, official and academic parties to build the Evaluation Working Group, regularly inspect the content and adequacy of service quality indicators; and to be announced for implementation after the trail time. Suggest including the enterprise's social responsibility indicator; elevating and encouraging the mobile operator to fulfill enterprise's social responsibility.

##### (2) Field experts opinions

So far the technical indicators (Radio Wave Coverage Disclosure and Wireless Internet data download rate disclosure and International Data Roaming Charge Alert) of "Key points of Implementation for Mobile Broadband Business Service Quality Specification" implement the fully information disclosure of official website/ sales outlets requested by NCC. In addition, the "Key points of Implementation for Mobile Broadband Business Service Quality Specification" is established after over three years of discussion, the covering aspects of present indicators are concrete and complete, not suggest to extend it. For the assessing operation, suggest following the present indicators making the self-assessment of

mobile operators, and review the necessity of adjustment. In the future, for the "assessment" made after the evaluation of competent authority, we hope to make the step-by-step way; the implementation of it should follow the self-assessing result of mobile operators made by NCC-assigned professional entity. Prior to assessing operation, it should invite vendors to participate in the discussion and make them to confirm the result before announcement, which will grant vendors the opportunity to appeal about. For the design of assessing procedure on the mobile broadband service quality, we suggest following the spirit of "Key points of Implementation for Mobile Broadband Business Service Quality Specification" to proceed.

### (3) Opinions from consumer groups

Mobile broadband service quality should follow the assessing result to strategize vendor services; the competent authority should urge the mobile operators to provide relative information to the public. Besides, the mobile broadband service quality indicators should take rolling modification matter under regular inspection, with different weights on Service Efficacy to reasonably show the operator's respective service level. To hold the objective and fairness, the assessment of service quality on mobile broadband should assign the fair third party performing it; operator's self-assessment isn't suggested. Prior to performing assessment, it should hold the vendors briefing to explain the assessing method and operation of grade calculation and disclosure of assessing result. The assessing result should be announced.

## 2. Future suggestion

### 1) Build the regular assessing mechanism of mobile broadband service quality.

According to Article 72 of the "Regulations for Administration of Mobile Broadband Businesses": "The mobile broadband system operated by the operator shall meet the service quality specification set by the competent authority on customer and system performance service quality... The competent authority may, depending on the actual needs, conduct assessment itself or assign the private organization to conduct assessment, and may regularly announce the operators' assessing reports of service quality. According to this article, we suggest NCC following the provisions to perform regular assessment of broadband service quality."

## 2) Add the indicator of mobile wireless device unlocking service

By researching and analyzing the quality items of mobile broadband service made in worldwide major countries (UK, Australia, Singapore, USA and Japan), the 25 service indicators specified in "Key points of Implementation for Mobile Broadband Business Service Quality Specification" have widely covered them and equivalent to global standard. Yet, in order to care about consumer rights and consistently promote the quality content of Taiwan mobile broadband service, if reviewing the content of service quality indicators specified in the "Key points of Implementation for Mobile Broadband Business Service Quality Specification", we suggest referring to the mobile wireless device unlocking service item specified in USA consumer guidelines of mobile telecommunication service, involve this item to Taiwan mobile broadband service quality indicators.

## 3) Build the history of Taiwan mobile broadband service information

Basing on the history of Australian communication service quality information framework; plan out the extended information history of mobile broadband service quality in Taiwan; use it as a study reference of Taiwan supervision policy and the accordance of service history for mobile operator; put the cost of human resource to each critical stage in the service journey, in the prospective of achieving high-efficiency service quality, and then the fully disclose the mobile broadband service information.

## 4) Transparency of unlimited Internet service plan information

By viewing the major international countries (UK, Australia, Singapore, the United States and Japan), the mobile Internet has been oriented towards the principle of fair use, clearly indicating that users can use unlimited data transmission; yet, when the data transmission exceeds a certain amount, the network data transmission speed will be limited. In some cases, it uses P2P speed limit, in some areas (offshore islands and remote areas), the network speed cannot reach the declared value. These measures are worth for domestic operators to refer to. In order to obtain a balance between the mobile network resource and user's Internet connecting service quality and rate, it is reasonable and should be accepted that domestic mobile operators control network resource; yet, if it is used as the means of providing consumers different services, it is an unfair business practice. Overviewing the international information transparency measure and interview opinions from consumer protection groups in this research project. We thus suggest NCC to refer to the current mobile operator's unlimited Internet service plan content, asking the unlimited mobile service provided by all mobile operators to be disclosed in a transparent manner.

5) Vendors continue to strengthen the image of company's social responsibility

In order to improve the quality of mobile communication service and reduce the number of complaints from consumers, this report associates the opinions from the information/communication experts and suggests that in the future, the mobile operators should interiorly reinforce the training of customer service staff on question response judgment and reason analysis of appealing cases and respective solution-making countermeasures; exteriorly, consistently drive the image of enterprise's social responsibility and enhance the service propaganda; shorten the gap between consumer expectation to service and make service information transparent. Get consumer's confidence to the telecommunication market by reducing the complaint amount from consumers.

6) Disclosing method of assessing result

In order to fulfill the related information disclosure for mobile broadband service quality items, we suggest that in the future, no matter NCC assigns fair and neutral third party to perform the assessing operation of mobile broadband service quality, or having mobile operators to make self-assessment and NCC assigns fair third party to review the assessing result, the disclosing method of assessing report information can consider that the competent authority asks mobile operators to announce the result in the respective official websites within certain time limit. But, if considering the fairness and effectiveness of assessing result disclosed, it should announce the result in NCC official website instead.