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The Effects of Country Image on Service Quality:

A Case of 5G Network Introduction in Thailand

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***Abstract*— The purposes of this research were to measure and compare the service quality perceptions of three potentially 5G network providers of the country from the U.S., South Korea, and China. Four hundred and thirty eight questionnaires were answered by perspective end-users in Bangkok. Statistical instruments such as mean, standard deviation, t-test, and One-Way-ANOVA with the significant level at 0.05 were selected to complete the process of data analysis. The results revealed that the highest service quality ranking was the 5G network providers from the U.S., South Korea, and China respectively. In hypothesis test, the average service quality of the U.S. was significantly higher than those of China. In addition, the study found that the service quality of network providers between developed countries (the U.S., and South Korea) and developing country (China) in this case were significantly different as well.**

***Keywords*—5G Network Provider, Country image, SERVQUAL, Thailand.**

I. Introduction

fifth Generation Network (5G) is the latest mobile communication network that offers the faster speed, lower latency, and a lot more connections with most of modern devices and machines such as drones, self-driving vehicles, robots, and smart home devices [1]. Without 5G, the internet traffic will be overload by the year 2021 due to billions of devices need to be connected [2]. In addition, the future machinery needs a super speed connection with very low latency. For example, the self-driving cars need to communicate each other in fraction of a second to avoid crash. From the perspective of the evolution of mobile wireless technology, the time for 5G has arrived considering timeline in the past that new generation of communication would emerge in every decade; 1G in 1980s', 2G in 1990s', 3G in 2000's, and 4G in 2010s'. Therefore, it is expected 5G will be commercially deployed by the year 2020 [1]. Currently, there are three leading companies in this next generation of network from 3 different countries; China, South Korea, and the United States [3]. Huawei from China was actually on track in this race since it already built 5G network, set a standard, operated in China in 2018, and globally expanded in 2019 [4].

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On the other hand, Verizon from the U.S. and SK Telecom from South Korea still dismissed each other in the showing events as the world first country that launched 5G network in April 2019 [3]. However, China has been banned its 5G expansion plan by the U.S. since the late 2018 giving security reasons. The U.S. also threatened other countries such as Germany, English, Canada, Australia, New Zealand, and Japan to drop 5G network from China [5]. It is an interesting question that what the motive is behind the U.S. ban. Is it political, security, or just China's country image?

Country image was consumers' general perceptions of a country that was created from national characteristics, economic and political background, history, traditions, and representative products or services [6]. The effects of country image on consumer decision making has been intensively studies in the past few decades because of its importance [7]. Since country image was also based on economic and technological strength of the country, developing countries might find it was difficult to sell products or services due to poor country image. In this case, China might have an image barrier to introduce its own 5G technology to foreign countries. The research question of this study was to find out whether China's country image was really a problem to the 5G network adoption in Thailand. Unlike the country of its own 5G technology such as U.S. and South Korea, Thai consumers did not have bias of nationalism or country interest from this technology invention. Therefore, the attitudes toward 5G service from different countries of perspective Thai end-users should be substantially valid to conclude that whether country image has any significant effect over the 5G network selection in early stage of technology adoption.

II. Literature Review

A. *Country Image*

Nagashima (1970) was the pioneer who defined country image as the picture, the reputation, and the stereotype that businessmen and consumers attach to products of a specific country. This image was created by such variables as representative products, national characteristics, economic status, political background, history, and traditions [6]. Country image was considered to be a country's asset because the better country image could generate higher sales for products or services [8] [9]. Country image, in economic point of view, was a reflection of country's economic and technological developments. Therefore, customers in developing countries would prefer to choose products and services from developed countries due to the belief that those products or services were produced in a better way and had better quality [10].

B. SERVQUAL

SERVQUAL is a concise of the original multiple item scale that contains 22 pairs of Likert-type items measuring customers' expectations and customers' perceived service quality. SERVQUAL was a quality framework developed during 1980's to measure service quality by measuring the gap between customers' expectations and the service delivery, not directly from service itself [11] [12]. In general, if the delivered service is less than what customers expected, the service quality is inferior. If the delivered service is met with what customers expected, the service quality is fine. Finally, if the delivered service exceeds from what customers expected, the service quality is superior.

SERVQUAL was composed of five dimensions which were reliability, tangibility, empathy, assurance, and responsiveness. However, these five dimensions had to be applied to a specific service sector. The modified SERVQUAL to IT services has been studied and conducted in many past research and results were quite satisfied [13][14][15]. In this study, the trade-off between benefit and security of 5G technology might be a major concern according to the news [5]. Thus the modification of SERVQUAL model would raise those issues into measuring dimensions. Thus the modified five dimensions of SERVQUAL in this study would be the followings;

1. Reliability: Ability to perform the promise service, 5G internet connection speed.
2. Assurance: Level of trust that data would be secured.
3. Tangibility: Readiness of providing 5G future devices and machines (hardware support).
4. Responsiveness: How quick to solve technical problems.
5. Empathy: Friendship and willingness to give assistance from the host country, (relationship).

C. The Effects of Country Image on Perceived Quality

Wright (1975) and Wall et al. (1991) found that consumers usually used country image rather than product or service attribute information to make a decision because it was an easy way to judge a product or service [16] [17]. Country image had a significant impact on consumers' selection process in situations that products or services were new, unfamiliar, and sophisticated technology [18]. When the products or services were from different countries with different economic development, the influence of country image would be even greater impacts. Studies found that Chinese businesses had problems when they expanded their businesses globally because the perception of Chinese brands was inferior [19].

Several studies in the past seemed to focus the research of country image's effect on products. However, services such as airlines, banking, insurance companies, and IT services are gaining popularity in this field recently. Previous research found that the country image effects on products had the equivalent effects on services as well [20].

III. Research Hypotheses

According to the literature review mentioned in the earlier part, the hypotheses of this research could be written as the followings;

H_1 The perceived service quality of 5G network providers from different countries is different.

H_2 The perceived service quality of 5G network providers from a developed country and those from a developing country are different.

IV. Methodology

A. Research Design

This research used questionnaires as a tool to collect data and analyzed by using Statistical Package for the Social Sciences (SPSS) software. The population of this research was the perspective 5G end-users who currently use 4G network for regular activities (communications, banking transactions, online shopping, video streaming, and online gaming) in Bangkok. According to the statistic data from National Statistical Office, Bangkok population was about 6 million people and 75% of them possess high speed internet which accouted for 4.5 million end-users [21][22]. From the Yamane sampling table at 95 % confidential level with ± 5 % error, the sampling size was 400 units [23]. The data were collected by purposive sampling. Four hundred and fifty questionnaires were distributed and 438 questionnaires were completed in return. Since 5G network will be commercially available in Thailand in 2020 next year [24], the respondents had to apply their own past experience using the products or services from the country they acquainted the most to answer the questionnaires. For the best results in practice, the respondents were informed the purpose of the study first, then selected the country that they knew best, and filled out the questionnaires.

B. Survey Instrument

The questionnaire was tested for its reliability and gave the result of 0.934 reliability of Cronbach's alpha. Also, the questionnaire had been approved by experts in the related field before using it as the means to collect the data. Based-on the potential 5G network providers, there were 3 major companies setting up as country representatives; Huawei from China, Verizon from the U.S., and SK Telecom from South Korea. All the rated questions were measured on a five-point Likert's scale by given 1 as the most disagreement and 5 as the most agreement.

C. Data Analysis

The attitudes toward service quality of 5G network providers from all 3 different countries were summarized as mean and standard deviation. Then the perceived quality

levels from each country image would be ranked. After that, the service quality of 5G network providers from the U.S., South Korea, and China were compared the differences by using One-Way-ANOVA and applied the Scheffe's method for pair-wise differences. Finally, the perceived service quality between developed countries (the U.S. and South Korea) and developing country (China) were compared the differences by using t-test.

v. Results

The quality levels of 5G network providers from the U.S., South Korea, and China from the total 438 qualified respondent were ranked by order of having highest quality service in average and showed in table 1.

TABLE I
THE RANKING OF COUNTRY IMAGE BY 5G SERVICE QUALITY

Rank	Country	Average Quality	S.D.	N
1	U.S.	3.73	0.681	150
2	South Korea	3.56	0.654	153
3	China	3.47	0.573	135

Table 1 showed that Thai end-users ranked the U.S. as the top country image by 5G service quality. South Korea and China were ranked as the second and the third. When service quality levels of 5G network providers from the U.S., South Korea, and China were calculated in each dimension as mean and standard deviation and illustrated in table 2.

TABLE II
THE SERVICE QUALITY PERCEPTION OF 5G NETWORK PROVIDERS IN THAILAND

Dimensions	U.S.		South Korea		China	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Internet Speed	3.85	0.792	3.76	0.809	3.68	0.843
Data Security	3.81	0.865	3.50	0.736	3.35	0.695
Hardware Support	3.75	0.845	3.54	0.778	3.44	0.816
Problem Solving	3.64	0.838	3.48	0.779	3.39	0.743
Relationship	3.61	0.835	3.50	0.82	3.49	0.845

From table 2, the U.S. had the highest country image of providing service quality in every dimension. South Korea had higher country image providing 5G service than those of China in every dimension also.

When service quality levels of each country were compared using One-Way-ANOVA, the significant differences were found in data security, hardware support, and problem solving dimensions as shown in table 3-5.

TABLE III
THE PAIR-WISE DIFFERENCES IN DATA SECURITY DIMENSION

Data Security	U.S.	South Korea	China
U.S.	0		
South Korea	0.310*	0	
China	0.459*	0.149	0

* Significant at 0.05 level

From table 3, the significant differences were found in the U.S.-South Korea pair, and the U.S.-China pair in data security dimension.

TABLE IV
THE PAIR-WISE DIFFERENCES IN HARDWARE SUPPORT DIMENSION

Hardware Support	U.S.	South Korea	China
U.S.	0		
South Korea	0.211	0	
China	0.310*	0.099	0

* Significant at 0.05 level

From table 4, the significant difference was found in only the U.S.-China pair in hardware support dimension.

TABLE V
THE PAIR-WISE DIFFERENCES IN PROBLEM SOLVING DIMENSION

Problem Solving	U.S.	South Korea	China
U.S.	0		
South Korea	0.156	0	
China	0.255*	0.098	0

* Significant at 0.05 level

From table 5, the significant difference was found in the U.S.-China pair in problem solving dimension. Then, when average service quality of each country was compared using One-Way-ANOVA, the result was illustrated in table 6.

TABLE VI
THE PAIR-WISE DIFFERENCES IN AVERAGE QUALITY DIMENSION

Average Quality	U.S.	South Korea	China
U.S.	0		
South Korea	0.174	0	
China	0.262*	0.087	0

* Significant at 0.05 level

From table 6, the significant difference was found in only the U.S.-China pair in average quality dimension. Finally, when 5G network providers from U.S. and South Korea were

combined into a single group as developed countries and then compared the service quality differences with those from China as developing country, the result was shown in table 7.

TABLE VII
THE SERVICE QUALITY DIFFERENCES BETWEEN DEVELOPED COUNTRIES AND DEVELOPING COUNTRY

	Developed Country		Developing Country		
N	303		135		
Dimensions	**Mean**	**S.D.**	**Mean**	**S.D.**	**Sig.**
Internet Speed	3.81	0.800	3.68	0.843	0.142
Data Secure	3.65	0.816	3.35	0.695	0.000*
Hardware Support	3.64	0.817	3.44	0.816	0.017*
Problem Solving	3.56	0.811	3.39	0.743	0.032*
Relationship	3.55	0.828	3.49	0.845	0.471
Average	3.64	0.672	3.47	0.573	0.009*

* Significant at 0.05 level

From all 303 samples of 5G network providers from developed countries and all 135 samples of 5G network providers from developing country, the significant differences were found in data security, hardware support, problem solving, and average quality dimensions. It meant that the service of 5G network providers from developed country was perceived as superior to those of 5G network providers from developing country.

VI. Conclusion

The results from this study revealed that the 5G network provider from China had quite poor country image in term of service quality level to those of competitors from U.S., and South Korea. In fact, the service quality level of 5G network provider from China was the lowest of all its competitors from developed countries in data security dimension with great amount of statistical significance. In addition, the study showed that when the ranking of average quality was low, it was likely to have the low quality level in every dimension. This might imply that the quality perception ranking was consistent throughout every quality dimension. Therefore, the quality perception might be a general perception of a specific country to a specific product or service.

However, when each quality dimension was carefully inspected, the results showed that the weakest part of service quality from the U.S. was in relationship dimension (friendship and willingness to give assistance from the host country), the weakest part of service quality from South Korea was in problem solving dimension (how quick to solve technical problems), and the weakest part of service quality from China was in data security dimension (level of trust that data would be secured). This result could bring the room for an improvement of 5G network provider from each country to compete better with its competitors.

In addition, previous studies found that the more advanced countries might have advantages over country image due to country's technology and know-how advancement [19], it could apply to this case. Even though China has been the leader in many important technology fields in the past few years [25], the respondents in Thailand might perceive that China was still different from those of developed countries. Since China has been rising so quickly, the country image in the past of China might be still there with poor quality products. This could help explain the concern of China rise.

The most interesting finding from this study was that since 5G network might considered be a kind of sophisticated technology, end-users might feel it difficult to fully trust. Just like other sophisticated products, consumers did seriously consider and took much time when they made a decision. Therefore, country image becomes an important factor for most people who do not fully understand the technology, the great barrier for China today.

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