RESEARCH BRIEF

Parameters Affecting Stakeholder's Satisfaction Level Towards the Service Quality of the Bangkok Metropolitan Administration Under the Context of United Nations-Sustainable Development Goals (UN-SDGs)

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The Bangkok Metropolitan Administration (BMA) consists of the Governor of Bangkok and the Bangkok Metropolitan Council. The main principles of the BMA are to develop and implement policies related to environmental management, urban planning, security services, household registration, public transport bus services, and public health services. According to the Bangkok Metropolitan Administration Act, BE 2528 (1985), the BMA has the legislative authority and duty to formulate and implement policies; appoint and remove deputy governors, advisors, and board members; and coordinate and carry out the orders of the Cabinet of Thailand, the Prime Minister of Thailand, and the Ministry of the Interior. Since the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development — adopted by world leaders in September 2015 at a historic UN Summit — officially came into force on January 1, 2016, the BMA has increasingly and comprehensively adopted them as a common and consistent way to promote sustainability. As part of 17 SDGs, sustainable cities and communities are considered 11 SDG due to several difficulties triggered by rapid urbanization. It is projected that almost 5 billion people will live in cities by 2030 (Ash et al., 2008). To maintain Bangkok as a hub for ideas, business, civilization, technology, prosperity, and social development, the BMA has launched the Bangkok Vision 2032, which incorporates six visionary aspects, 31 strategies, and 115 measures as follows (Samdrup, 2011):

- *A safe city*: six strategies and 52 measures
- *A green and comfortable city*: four strategies and 20 measures
- *A city for all*: five strategies and 14 measures
- *A compact city*: two strategies and 12 measures
- *A democratic city*: five strategies and 29 measures
- *A city with a growing economy and life-long learning*: nine strategies and 28 measures

Apart from the 31 strategies and 155 measures, as clearly described in six visionary aspects of the Bangkok Vision 2032, multiple projects related with SDGs such as smart public transportation (11 SDG: sustainable cities and communities), an environmental quality assessment (13 SDG: climate action), the gender-specific composition in asset ownership (five

SDG: gender equality), and an estimation of the number of HIV-infected injection drug users (three SDG: good health and well-being) have been conducted over the past few decades. More details of the projects are as follows:

(i)   Bus Rapid Transit (BRT) has been introduced as a powerful urban transit system in many developing Asian cities as a result of its cost-effective and flexible implementation (Satiennam et al., 2006);

(ii) Several projects have been conducted to monitor the levels of $PM_{2.5}$, polycyclic aromatic hydrocarbons (PAHs), carbonaceous particles, and heavy metals in the ambient air of the Bangkok Metropolitan Region (BMR; Pongpiachan, 2013; Pongpiachan & Iijima, 2016; Pongpiachan et al., 2017a, 2017b);

(iii) The gender-specific composition in asset ownership was investigated among low-income, urban households in Bangkok, Thailand in 2002 (Antonopoulos & Floro, 2005); and

(iv) Public health services for drug users infected with the human immunodeficiency virus (HIV) were carefully planned based on the estimation of 36,600 opiate users in Bangkok (Mastro et al., 1994).

In spite of numerous projects connected with the principles of SDGs, there are currently no reports or publications available for stakeholder satisfaction (SSAT) associated with the performance of BMA staff to promote the philosophy of SDG to local residents. Furthermore, the impacts of independent parameters of stakeholders (e.g., age, gender, education level, occupations) on SSAT towards numerous aspects related to SDGs remain unclear. Overall, the main principles of this study are as follows:

(i)   Quantitatively evaluate SSAT related to the performance of BMA staff by applying the six-point Likert scale questionnaire ($n = 38,500$);

(ii) Apply some advanced statistical techniques, such as t-tests, an analysis of variance (ANOVA), Pearson correlation analysis (PCA), and multiple linear regression analysis (MLRA) to interpret numerically the relationship between independent parameters

of stakeholders and their SSAT associated with SDGs; and

(iii) Propose the most realistic policies for the BMA to promote the concept of SDGs based on a quantitative sociological survey.

Methods

Sample Size Criteria

Previous studies have used various statistical techniques to calculate sample size, such as applying a census for relatively low densities of population, using published equations to compute a sample size, and adopting a sample size of equivalent research (Cochran, 1963; Singh & Masuku, 2012; Sudman, 1976). In spite of numerous advantages of using the same sample size as those of investigations equivalent to the targeted one, some concerns were raised about risks of generating systematic errors that were involuntarily performed during the calculation of sample size for another study. It is also crucial to emphasize that to adopt the total population as the sample size is an unrealistic method for determining the sample size of an extremely large population. For instance, the 2016 population of Bangkok is approximately 8,281,000, which was taken from the most recent census in 2010. Furthermore, there are still some uncertainties concerning the calculation of sample size by using the number that appears in the table due to its basic assumption of a normal distribution. As a consequence, several sociological investigations have carefully used the equation recommended by Yamane (1967; Equation 1) because of the advantages in selecting degrees of precision, confidence level, and variability (Pongpiachan, 2018a, 2018b). In this study, the minimum population number calculated by Equation 1 was 9,988 ($n = 8,281,000$; $e = 0.01$).

$$n = \frac{N}{\left(1 + Ne^2\right)} \tag{1}$$

where n, N, and e represent the minimum population number, the total number of residents in Bangkok, and acceptable inaccuracy rate, respectively. It is also important to note that the Yamane formula can be used only for a known residential number with a simple random sampling method principally created for empirical questionnaire surveys instead

of being correlational or for scientific experimental investigation. In addition, the total number of questionnaire respondents of this study was 38,500, which was almost four times higher than the minimum number calculated by using Equation 1.

Sociological Sampling Locations

BMA Districts (n = 50)

In this sociological survey, a simple random sampling (SRS) method was rigorously selected to achieve accurate and comprehensive data from the targeted group by interviewing the stakeholders who received customer services in 50 BMA districts. Geographical cluster (see Figure 1) sampling locations are constructed of Khlong San District Office (D1), Khlong Sam Wa District Office (D2), Khan Na Yao District Office (D3), Chatuchak District Office (D4), Chom Thong District Office (D5), Donmuang District Office (D6), Din Daeng District Office (D7), Dusit District Office (D8), Taling Chan District Office (D9), Thawi Watthana District Office (D10), Thung Khru District Office (D11), Thon Buri District Office (D12), Bangkok Noi District Office (D13), Bankok Yai District Office (D14), Bang Kapi District Office (D15), Bang Khun Thian District Office (D16), Bang Khen District Office (D17), Bang Kho Laem District Office (D18), Bang Khae District Office (D19), Bang Sue District Office (D20), Bang Na District Office (D21), Bang Bon District Office (D22), Bang Phlat District Office (D23), Bang Rak District Office (D24), Bueng Kum District Office (D25), Pathum Wan District Office (D26), Prawet District Office (D27), Pom Prap Sattru Phai District Office (D28), Phaya Thai District Office (D29), Phra Khanong District Office (D30), Pha Nakhon District Office (D31), Phasi Charoen District Office (D32), Min Buri District Office (D33), Yan Nawa District Office (D34), Ratchathewi District Office (D35), Rat Burana District Office (D36), Lat Krabang District Office (D37), Lat Phrao District Office (D38), Wang Thonglang District Office (D39), Vadhana District Office (D40), Suan Luang District Office (D41), Saphan Sung District Office (D42), Samphanthawong District Office (D43), Sathon District Office (D44), Sai Mai District Office (D45), Nong Khaem District Office (D46), Nong Chok District Office (D47), Lak Si District Office (D48), Huai Khwang District Office (D49), and Khlong Toei District Office (D50).

BMA Offices (n = 27)

BMA offices were deliberately chosen for quantitative sociological analysis. The majority of questionnaire respondents were BMA government
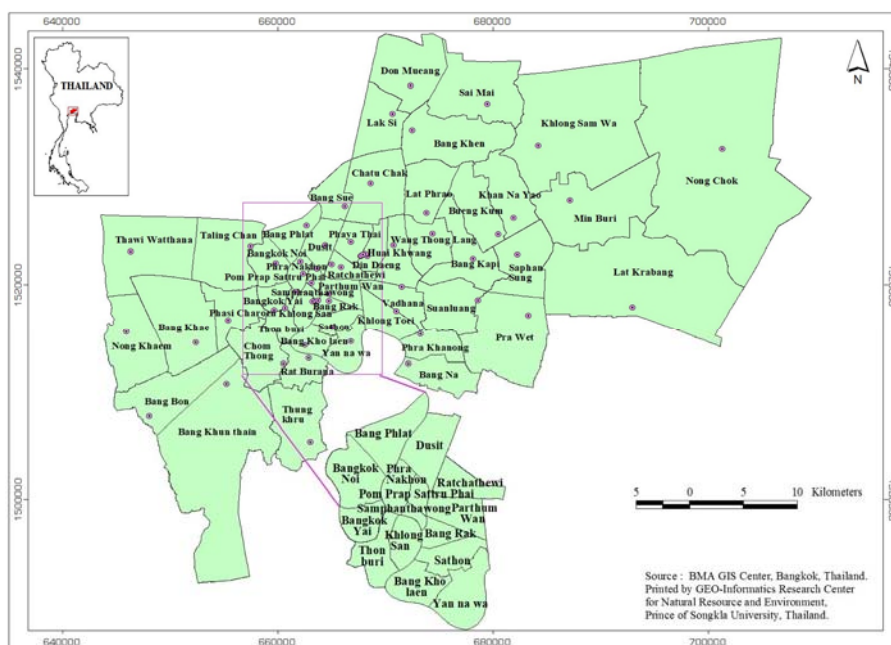

Figure 1. Geographical Locations of the 50 BMA Districts

officers, private sector employees, and local residents. All 27 sampling areas, as shown in Figure 2, consisted of the Finance Department (U1), BMA Budget Department (U2), Strategy and Evaluation Department (U3), Office of the BMA Civil Service Commission (U4), The Secretariat of Bangkok Metropolitan Council (U5), The Governor of Bangkok Secretariat (U6), BMA Training and Development Institute (U7), BMA Law and Litigation Department (U8), Administration and Registration Office (U9), Internal Audit Office (U10), Personnel Office (U11), International Affairs Office (U12), Public Relations Division (U13), Inspector General Division (U14), Office of the Permanent Secretary for the BMA (U15), Education Department (U16), Traffic and Transportation Department (U17), Public Works Department (U18), Department of Drainage and Sewerage (U19), City Law Enforcement Department (U20), Fire and Rescue Department (U21), City Planning Department (U22), Social Development Department (U23), Environment Department (U24), Medical Service Department (U25), Culture Sports and Tourism Department (U26), and Health Department (U27).
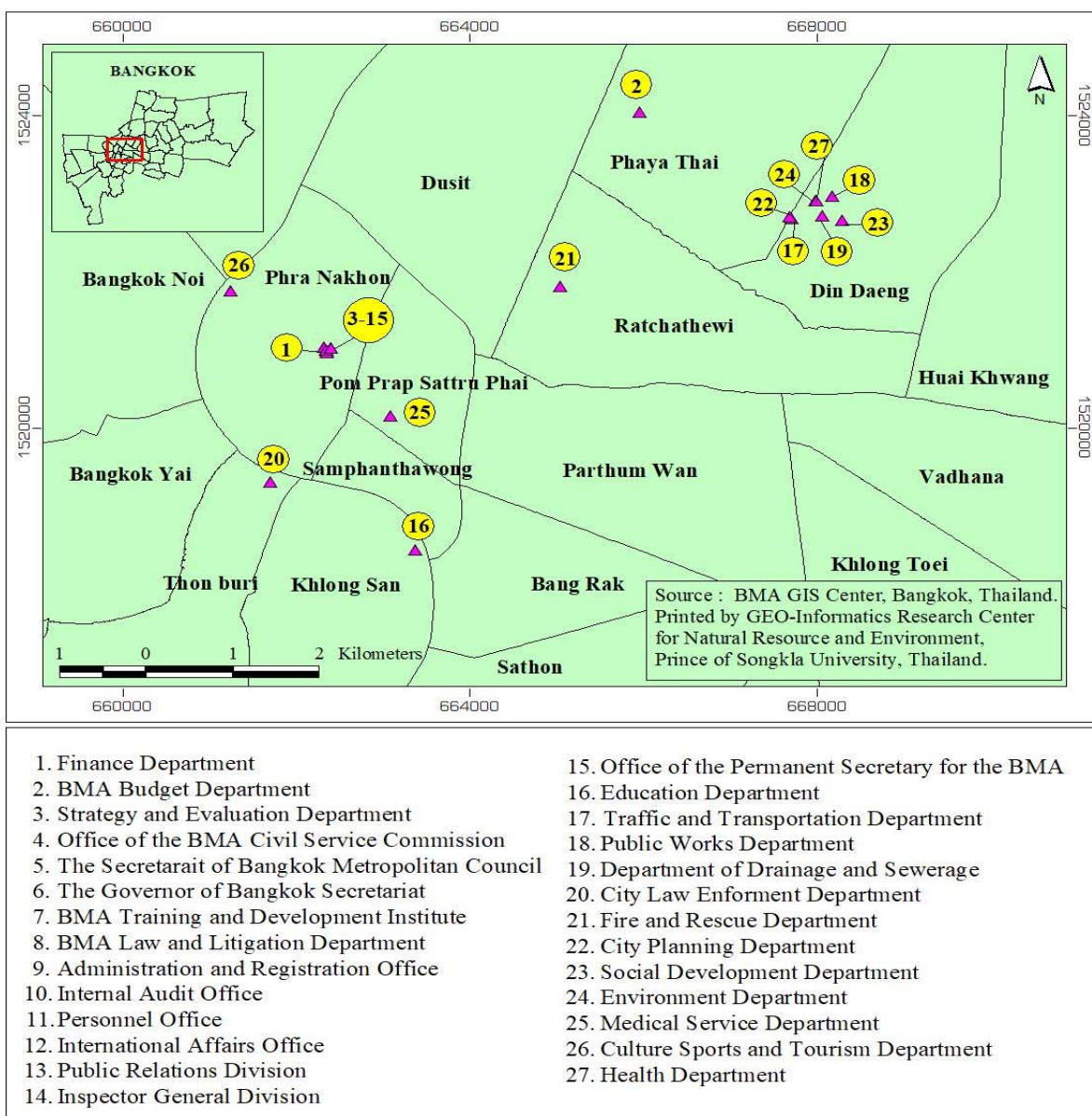

1. Finance Department
2. BMA Budget Department
3. Strategy and Evaluation Department
4. Office of the BMA Civil Service Commission
5. The Secretarait of Bangkok Metropolitan Council
6. The Governor of Bangkok Secretariat
7. BMA Training and Development Institute
8. BMA Law and Litigation Department
9. Administration and Registration Office
10. Internal Audit Office
11. Personnel Office
12. International Affairs Office
13. Public Relations Division
14. Inspector General Division
15. Office of the Permanent Secretary for the BMA
16. Education Department
17. Traffic and Transportation Department
18. Public Works Department
19. Department of Drainage and Sewerage
20. City Law Enforment Department
21. Fire and Rescue Department
22. City Planning Department
23. Social Development Department
24. Environment Department
25. Medical Service Department
26. Culture Sports and Tourism Department
27. Health Department

Figure 2. Geographical Locations of the 27 BMA Offices

Sampling Devices

The design of sociological survey questionnaires is an art that requires some professional expertise. A questionnaire should theoretically be realistic, comprehensible, explicit, non-discriminatory, capable of dealing with all potential feedbacks, adequately summarized, authorized, and ethical. The pivotal processes for strategic success in depicting a sociological questionnaire are to determine what information was requested, chose features for involvement, portray the personal inquiries, construct the sentences, illustrate the outline, summarize the contents, arrange the first draft and pre-test, pilot and assess the form, and conduct the sociological study. In this survey, the questionnaire was designed to have closed- and open-ended inquiries. The sociological questionnaire was constructed with three parts (see Figures 3 and 4), which are:

Bangkok Metropolitan Administration (BMA)
Services Satisfaction Survey 2018
Conducted by Inspector General Devision and School of Social and
Environmental Development, National Institute of Development Administration

Questionnaire Form: U20
NO. E

Part 1: Please give your Satisfaction Levels toward the performance of the City Law Enforcement Department in the following areas:	1 very unsatisfied	2 unsatisfied	3 slightly unsatisfied	4 slightly satisfied	5 satisfied	6 very satisfied
Services						
1 Service procedures are clear and concise.						
2 Services are fast and convenient.						
3 Services are given according to first-come-first-served basis.						
Officials						
4 Officials are polite and service-minded.						
5 Officials are knowledgable, informative and able to answer questions.						
6 Officials are honest and honorable.						
Services via Internet						
7 The Department's website, Line, Facebook page are easy to access and navigate.						
8 The information provided on department's website, Line, Facebook page is correct, complete and up-to-date.						
Facilities						
9 The Department's facilities are easy to access and conveniently located.						
10 The Department's facilities clean and organized.						
11 Overall areas, including buildings, side-walks, and yards, look pleasing and are in good conditions.						
Problem Management						
12 Various channels are provided to give suggestions and complaints or to report problems.						
13 Quick responses to the suggestions and complaints. Problems reported are quickly attended to.						
Department's Development						
14 Procedures and service equipments are constantly upgraded.						
15 Official's abilities and knowledge are constantly improved through training programs.						

Figure 3. Questionnaire for the Sociological Survey Assessing the Level of Satisfaction of BMA's Stakeholders Towards the Service Quality of the City Law Enforcement Department's Staff (Part I)

Part 1: Opinions about the satisfaction level of interviewees or questionnaire respondents towards the quality of service procedures, speed of services, first-come-first-served basis, politeness of staff, quality of facilities, problem management, and the department's development.

Part 2: Specific opinions about the satisfaction level of interviewees or questionnaire respondents towards the quality of projects, development, improvement, supportive efforts, and works in harmony and synchronization with other BMA's departments.

Part 3: General information such as questionnaire respondent's gender, age, education, occupation, place of residency, place of work, and length of employment.

Figure 4. Questionnaire for the Sociological Survey Assessing the Level of Satisfaction of BMA's Stakeholders Towards the Service Quality of the City Law Enforcement Department's Staff (Part I)

All satisfaction levels can be categorized as follows:

Extremely satisfied (6 points)
Very satisfied (5 points)
OK (4 points)
Neither satisfied nor dissatisfied (3 points)
Dissatisfied (2 points)
Extremely dissatisfied (1 point)

In addition, the scores of answers can be classified as follows:

High (80-100%)
Medium (70-79%)
Low (0-69%)

Statistical Analysis

This sociological survey adopted a research procedure named descriptive statistics, which describes a basic feature of information, such as the average, standard deviation, minimum, and maximum. It is also crucial to emphasize that some fundamental characteristics, such as gender, age, education, occupation, place of residency, place of work, and length of employment, coupled with satisfaction levels of 18 sociological survey items (i.e., dependent parameters) will be quantitatively evaluated by applying *t*-tests, analyses of variance (ANOVA), simple linear regression analyses (SLRA), Pearson correlation analyses (PCA), and multiple linear regression analyses (MLRA) with the assistance of SPSS (Statistical Package for the Social Sciences) version 13. The Gaussian distribution function (GDF), a statistical method that is frequently employed in the natural and social sciences to reflect real-valued random variables whose distributions are not known, was used for all ages of questionnaire respondents (*n* = 38,500). It is well known that the GDF of a standard normal distribution can be written as follows:

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{\frac{-x^2}{2}} \qquad (2)$$

where *e*, *x*, and *p* represent the exponential constant (i.e., 2.718), intensity (counts), and *pi* (i.e., 3.142), respectively. If a random variable *x* is given, and its distribution has a probability density function *f*, then the estimated value of *x* can be calculated as follows:

$$E[X] = \int_{-\infty}^{\infty} x f(x) dx \qquad (3)$$

A distribution has a density function if and only if its cumulative distribution function *F(x)* is absolutely continuous. In this case, *F* is differentiable almost everywhere, and its derivatives can be used as the probability density as follows:

$$\frac{d}{dx} F(x) = f(x) \qquad (4)$$

The probability for the random variable to be within a particular region is given by the Gaussian distribution, which can be described as follows:

$$y = \frac{1}{\sigma \sqrt{2\pi}} \exp\left(\frac{-(x - \mu)}{2\sigma^2} \right) \qquad (5)$$

where *y*, *s*, σ^2, *m*, and *x* represent the GDF, standard deviation, variance, average, and age of each stakeholder, respectively.

Results

Boxplots of Questionnaire Respondents' Satisfaction Levels

Non-parametric boxplots have been widely used in different academic fields due to their capacity to perform simultaneous rapid graphical investigations of one or more datasets (Hyndman & Shang, 2010; Rajagopalan et al., 1997; Sun and Genton, 2011). In this sociological assessment, the boxplot was adopted to compare distributions between 11 different occupational groups, as clearly described in Table 1. Variable-width boxplots depict the magnitude of each occupation whose overall satisfaction level (i.e., the average of 15 satisfaction levels written in questionnaire part-1) is being plotted by making the width of the box proportional to the size of the occupational group (see Figure 5).

Several features can be extracted from Figure 5. First, the boxplot of 27 BMA offices is relatively larger than those of the 50 BMA districts. These results fundamentally reflect a greater variability of the respondents' satisfaction levels obtained at 27 BMA

offices in comparison with those of the 50 BMA districts. It is also crucial to emphasize that the respondents of the 27 BMA offices are from both internal customers (e.g., BMA officers) and external customers (e.g., residents registered in Bangkok), whereas those of the 50 BMA districts were purely based on external customers. Previous studies have measured internal customer satisfaction levels in various types of NGO organizations, private companies, and government sectors (Lapré & Tsikriktsis, 2006; Mattila & Ro, 2008; Piercy, 1995). There was a tendency throughout the 465 employees exhibiting 150 internal customer teams that the expected (self) scorings of the members of internal intact work teams were comparatively

more positive than those scorings genuinely attributed to them by their internal customers (Gilbert, 2000). Furthermore, some significant discrepancies in the parameters governing perceived quality are detected between internal and external customers, which can be explained by the differences that arise from the degree of dependence and frequency/length of contact between the service and the customer (Galloway, 1998). For these particular reasons, it appears plausible to interpret the comparatively larger box size found in the boxplot of the 27 BMA offices as a consequence of a mixture between internal and external customers answering sociological surveys.
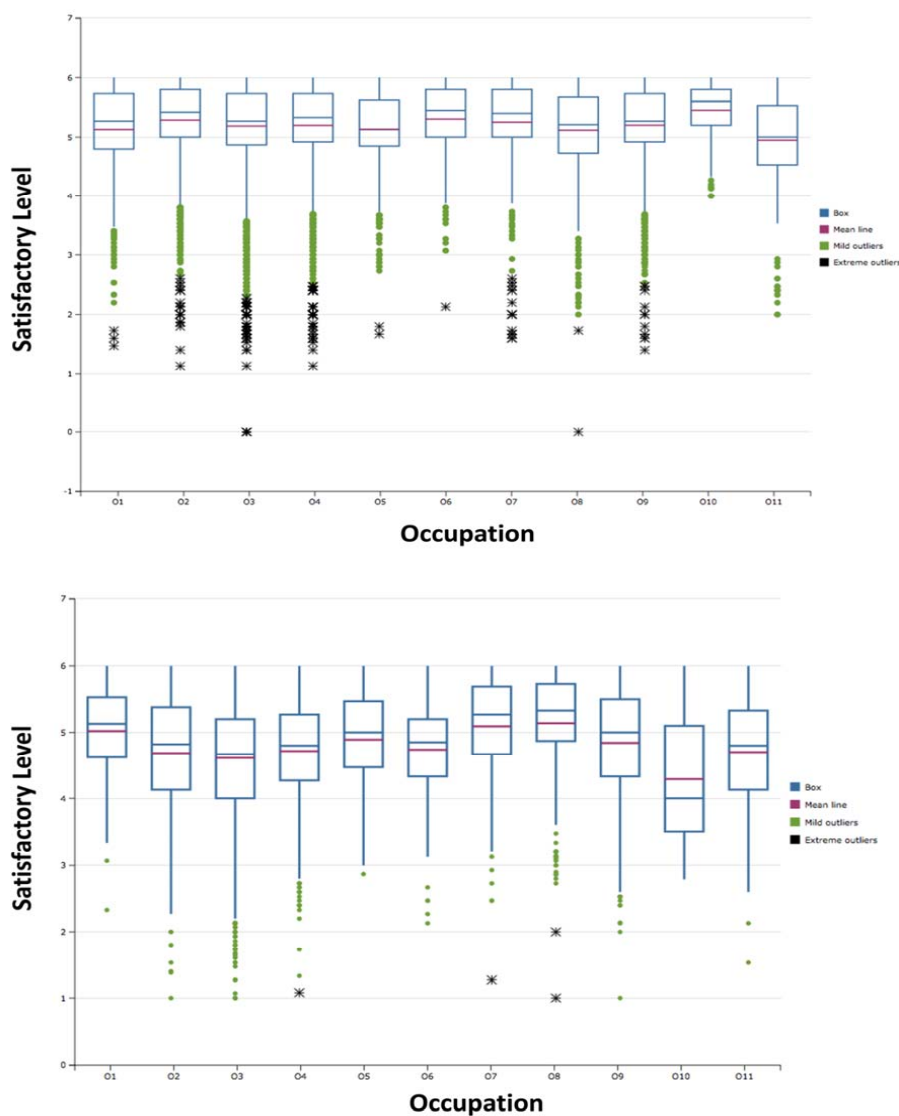

Figure 5. Box Plots of Respondents' Satisfaction Level on a Questionnaire Based on Their 11 Different Occupations

Table 1

A T-Test Applied in Examining Gender Differences in Average Level of Satisfaction in 15 Questions Conducted at 27 BMA Units

Male															
Question	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15
Aver	4.672	4.730	4.835	4.906	4.858	4.959	4.399	4.409	4.665	4.755	4.690	4.518	4.528	4.528	4.609
Stdev	1.030	0.999	1.003	0.978	0.963	0.968	1.170	1.081	1.042	1.008	1.047	1.031	1.051	1.024	1.029
n	5,035	5,030	5,009	5,045	5,037	4,972	4,676	4,645	5,027	5,027	5,011	4,987	4,952	4,993	4,936
Female															
Question	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15
Aver	4.687	4.743	4.839	4.932	4.882	4.987	4.446	4.458	4.656	4.736	4.657	4.507	4.510	4.534	4.607
Stdev	0.977	0.956	0.940	0.961	0.958	0.927	1.018	1.022	1.003	0.960	0.995	1.002	1.033	0.990	0.989
n	8,167	8,173	8,146	8,177	8,175	8,103	7,696	7,677	8,160	8,164	8,140	8,109	8,078	8,103	8,076
t-value	0.87	0.75	0.19	1.51	1.44	1.65	2.29	2.52	0.52	1.05	1.76	0.56	0.94	0.36	0.07
$p < 0.05$	NS	NS	NS	NS	NS	**S**	**S**	**S**	NS	NS	**S**	NS	NS	NS	NS

Table 2

A t-Test Applied in Examining Gender Differences in Average Level of Satisfaction in 15 Questions Conducted in 50 BMA Districts

Male															
Question	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15
Aver	5.203	5.256	5.400	5.337	5.337	5.396	4.962	4.995	5.285	5.365	5.281	5.095	5.099	5.082	5.085
Stdev	0.92	0.87	0.80	0.81	0.79	0.79	0.98	0.99	0.83	0.79	0.85	0.91	0.95	0.87	0.91
n	11,331	11,330	11,291	11,340	11,330	11,251	10,379	10,362	11,334	11,334	11,296	11,212	11,149	10,932	10,771
Female															
Question	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15
Aver	5.184	5.266	5.381	5.334	5.333	5.387	4.970	4.992	5.309	5.369	5.295	5.095	5.107	5.072	5.098
Stdev	0.93	0.87	0.80	0.82	0.80	0.80	0.98	0.99	0.82	0.78	0.85	0.91	0.95	0.88	0.93
n	13,498	13,509	13,455	13,504	13,504	13,396	12,385	12,349	13,511	13,503	13,473	13,360	13,320	13,026	12,875
t-value	1.67	0.87	1.87	0.23	0.41	0.92	0.59	0.21	2.22	0.42	1.27	0.02	0.62	0.90	1.05
$p < 0.05$	**S**	NS	**S**	NS	NS	NS	NS	NS	**S**	NS	NS	NS	NS	NS	NS

Gaussian Distribution Function (GDF) of Questionnaire Respondents' Age

Apart from investigating boxplots and histograms of the satisfaction level obtained from this study, there are numeric measures of skewness coupled with some advanced statistical techniques of the normal distribution. The Gaussian distribution function (GDF) is a mathematical formulation that characterizes a probability distribution for a continuous random parameter as opposed to a discrete random parameter.

In the case of the distinctly displayed GDF, the area under the curve will reveal the probability of occurrence of a continuous random parameter. Previous studies have applied the GDF to evaluate the symmetricity of a bell-shaped curve of data in environmental sciences (Pongpiachan et al., 2013a, 2013b, 2015; Pongpiachan & Iijima, 2016), astrophysics (McDonald et al., 2000), psychology (Link & Heath, 1975), risk analysis (Clemen & Winkler, 1999), and social studies (Newman & Park, 2003; Pongpiachan, 2018a, 2018b).
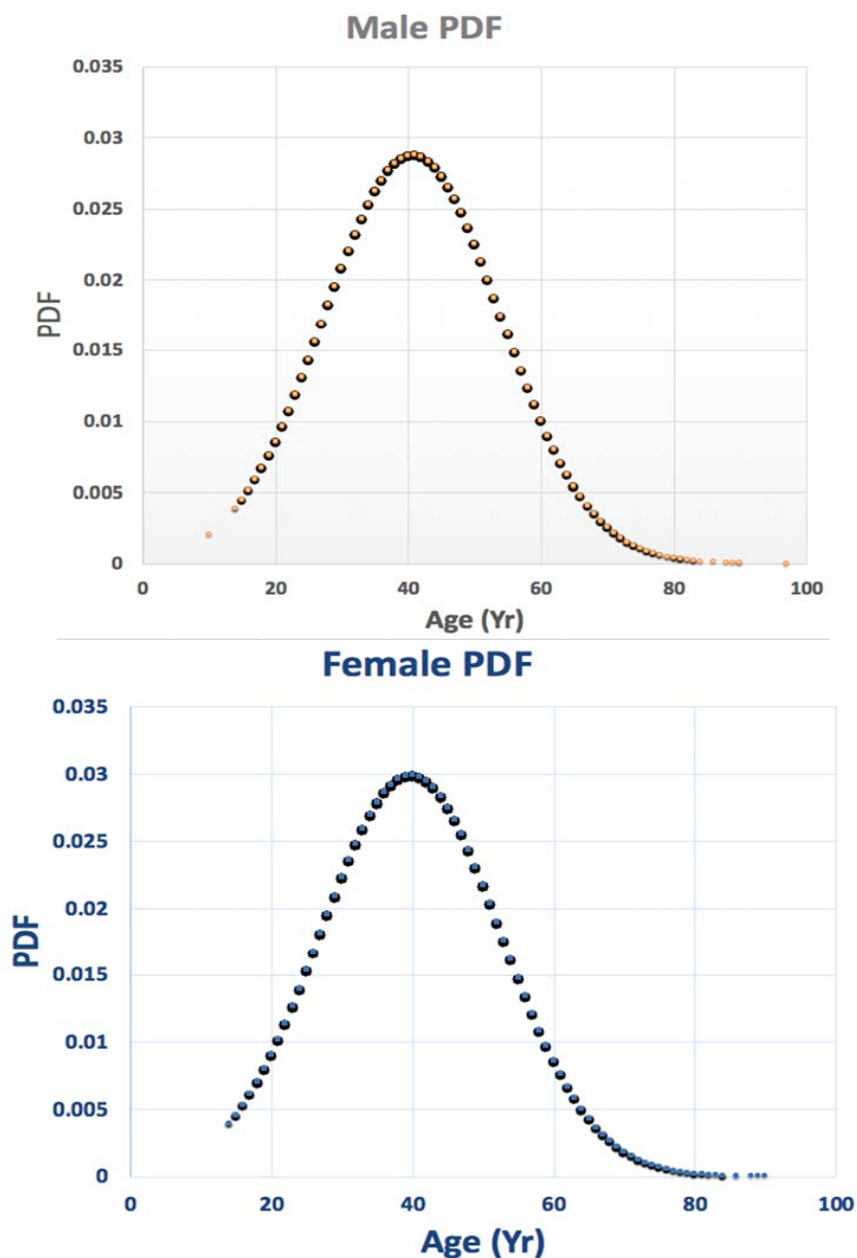

Figure 6. Gaussian Distribution Function (GDF) of Respondent's Age Based on Their Gender

As noticeably illustrated in Figure 6, numerous prominent components of the GDF can be principally extracted from the original graphs. First, the mean, median, and mode are almost equal and are positioned at the center of the curve, highlighting a continuous symmetric bell-shaped normal distribution of a variable for both genders. As the calculated values of the GDF are comparatively more concentrated in the center than in the tails, it seems rational to interpret this finding to an adequate homogeneous spatial distribution of the questionnaire respondents' ages for both genders. Second, Figure 6 can be considered to be symmetric about the mean (i.e., neither positive-skew distribution nor negative-skew distribution), and there are no gaps or holes. For each value of age, there is a corresponding value of the GDF. Third, the curve never touches the *x*-axis, and the total area under a normal distribution is almost equal to 1.00 or 100%. In addition, it appears reasonable to adopt a *t*-test, ANOVA, MLRA, and PCA for further statistical assessment based on the principle assumption that the two populations being evaluated should theoretically follow a normal distribution.

t-Test for Gender Differences in Respondents' Satisfaction Levels

Over the past few decades, there have been several studies applying *t*-tests to assess gender differences on questionnaire respondents' satisfaction levels, job satisfaction, and utilization of health care services (Bertakis et al., 2000; Hodson, 1989; Pongpiachan, 2018a, 2018b). As displayed in Tables 1 and 2, a *t*-test was employed in investigating gender differences in the average satisfaction level towards 15 questions as answered by respondents at the 27 BMA units and in 50 BMA districts. Some gender differences in satisfaction levels were detected at questions No. 6, No. 7, No. 8, and No. 11 for the BMA units and No. 1, No. 3, and No. 9 for BMA districts. It is interesting to note that female respondents tend to be significantly satisfied with the quality of social media authorized by the 27 BMA units (i.e., questions No. 7 and No. 8) in comparison with male respondents (see Table 1).

A recent study highlighted the relatively high 68% of all female social media (e.g., Facebook, Line, Twitter, Instagram) use in comparison with that of 62% of all male social media use (Perrin, 2015). Numerous factors influence females' satisfaction levels on the use of social media. First, a socio-linguistic study has demonstrated that males tend to concentrate discourse on hierarchy and independence, whereas females focus on intimacy and solidarity (Gefen & Straub, 1997). Second, female Facebook users tend to "like" a Facebook status update in comparison with male users, post a public reply more frequently than male users, and display higher levels of emotional support than male social media users (Joiner et al., 2014). Third, female Facebook users tend to have longer Facebook profiles, a higher frequency of using Facebook, and are more sensitive about their Facebook use in comparison with males (Shepherd, 2016). Given that social media messages may be perceived differently by genders, these findings suggest that BMA authorities should

Table 3

Occupational Classification Used in the Sociological Assessment

Code	Occupational Description
Occupation-1	Unemployment/Joblessness Groups
Occupation-2	Private Business
Occupation-3	Government Officers/State Enterprise Employees
Occupation-4	Private Company Employees
Occupation-5	High School Students/College Students
Occupation-6	Professional Jobs (e.g., Medical Doctor, Solicitor, Lawyer)
Occupation-7	Retirement Groups
Occupation-8	Housewives/House Husbands
Occupation-9	Freelance Groups
Occupation-10	Agricultural Business Groups
Occupation-11	Others

theoretically focus on designing gender-oriented social media to communicate messages more effectively to a specific group of stakeholders. It is also interesting to note that female respondents of the 50 BMA districts were significantly less satisfied with the quality of service procedures, as seen in questions No. 1 and No. 3 (see Table 2). In fact, the majority of females tend to be dissatisfied with the organization of the "First Come First Serve (FCFS)" policy conducted by BMA staff. To enhance the satisfaction level of female stakeholders, particular attention should be paid to the processes of organization and management of service procedures.

Analysis of Variance (ANOVA) on Occupation Difference in the Satisfaction Levels

The present study categorized the respondents into 11 groups based on their occupations, as described in Table 3. In this study, ANOVA was conducted to compare the average satisfaction level of respondents with 11 different occupations from the 27 BMA units and 50 BMA districts. According to the sociological survey of the 27 BMA units, housewives/househusbands, retirement groups, and unemployment groups displayed the three highest-ranked satisfaction levels with average values of 5.139, 5.093, and 5.020, respectively ($F = 37.085$, $p < 0.001$, $n = 13,197$). In contrast, some significant lowest satisfaction levels were detected from agricultural business groups, government officers/state enterprise employees, and private business groups, with average values of 4.290, 4.611, and 4.686, respectively. It is interesting to note that the non-working group (i.e., O8, O7, O1) tended to be satisfied with the quality of BMA staff service in comparison with the government officers and private business groups (i.e., O10, O3, O2).

A further assessment was performed by using questionnaire satisfaction levels of 11 different occupations collected at the 50 BMA districts. Agricultural business groups, professional jobs (e.g., medical doctor, solicitor, lawyer), and private business groups had the three highest-ranked satisfaction levels, with average values of 5.453, 5.303, and 5.287, respectively ($F = 22.536$, $p < 0.001$, $n = 38,689$). On the other hand, other occupations, housewives/househusbands, and unemployed groups showed the lowest satisfaction levels, with average values of 4.945, 5.118, and 5.128, respectively. The fact

that government officers showed comparatively low satisfaction levels detected at the 27 BMA offices reflect some organizational problems connected with the quality of internal customer services.

It is well known that internal customer services are positively correlated with job satisfaction, which is one crucial indicator of an organization's work environment (Hallowell et al., 1996; Jun & Cai, 2010). To enhance the satisfaction levels connected with internal customer services, numerous policies need to be implemented. For instance, the emerging e-service filed can significantly reduce the complexity of the procurement process and subsequently leads to the satisfaction of internal customers (Croom & Johnston, 2003). A previous study highlighted that customer intimacy is the most prominent key factor in obtaining both high internal customer service quality and internal customer satisfaction (Jun & Cai, 2010). Surprisingly, team-based continuous development and requisition processes are the second and third most crucial key factors of service quality but are not significantly related to internal customer satisfaction (Jun & Cai, 2010). It is also crucial to note that internal customer service appears to have a mixed, complex relationship with external customer service, and thus, the interpretation of respondents' satisfaction levels should be conducted with the greatest caution (Farner et al., 2001). Overall, BMA administrative boards should deliberately consider the improvement of internal customer services as one of the key successes in achieving the UN-SDG.

A Multiple Linear Regression Analysis (MLRA) on Assessing Factors Affecting Satisfaction Level of Respondents

Previous studies have suggested that MLRA can be used to quantitatively investigate the relationship between some independent variables (e.g., age, education level, frequency of visiting BMA office, residential length) and a dependent parameter (e.g., satisfaction level of respondents; Pongpiachan, 2018a, 2018b). The MLRA was designed to simulate the correlation between two or more independent parameters and a response-dependent variable by fitting a linear equation to detected data. Every value of the independent parameter "x" is related to a value of the dependent parameter "y." Three main assumptions of MLRA are that (i) the regression residuals have to be theoretically normal distributed, (ii) a linear

relationship between the independent and dependent variables should exist, and (iii) multicollinearity should not exist (Pongpiachan, 2018a, 2018b). By using the average satisfaction levels (i.e., the average of satisfaction scores of questions no. 1–15) obtained from the respondents, coupled with independent factors such as the actual age (*AGE*), education level (*EDU*), frequency of visiting BMA offices and districts (*Freq*), and residential length of stay in Bangkok (*Length*), an MLRA was deliberately quantified and displayed in equations (5)–(6). In the present research, SPSS (Ver 13.0) was employed to conduct an MLRA by inputting the dependent parameters (i.e., average of satisfaction scores of questions no. 1-15) and independent parameters (i.e., *AGE*, *EDU*, *Freq*, *Length*). MLRA formulas can be written as follows:

$$\text{SL-50-Districts} = 5.04 + 0.00264 \times \text{AGE} + 0.0127 \times \text{EDU} + 0.0480 \times \text{Freq} - 0.0215 \times \text{Length} \quad (5)$$

$$\text{SL-27-Units} = 4.79 + 0.00485 \times \text{AGE} - 0.0823 \times \text{EDU} + 0.0723 \times \text{Freq} - 0.00179 \times \text{Length} \quad (6)$$

Several factors are deeply connected with MLRA outcomes, as displayed in equations (5) and (6). There are numerous components related to MLRA results. First, *AGE* and *Freq* are positively correlated with satisfaction scores of questionnaire respondents for both the 27 BMA offices and 50 BMA districts. These findings highlight the fact that older people who regularly visit BMA offices and districts are generally satisfied with the service quality. Second, *EDU* is positively correlated with the satisfaction scores collected in the 50 districts, whereas negative correlations were detected at the 27 BMA offices. These results indicate that highly educated questionnaire respondents are generally satisfied with the service quality of the staff of the 50 BMA districts. In contrast, highly educated internal customers (i.e., BMA staff from other offices) appear to cast a critical eye over the internal service quality of BMA colleagues. Third, *Length* is negatively correlated with satisfaction levels for both the 27 BMA offices and 50 BMA districts. These facts have raised some particular concerns over the long-term satisfaction levels of Bangkok residents on BMA staff service quality.

Pearson Correlation Analysis (PA) on Satisfaction Levels of BMA Stakeholders

An assessment of the Pearson correlations suggested that the following districts had extremely strong positive correlations ($R > 0.9$): D1 vs. D6–D10 and D46–D48; D11–D13 vs. D6–D10; D19–D21 vs. D5–D8; D29–D39 vs. D8–D10 (see Fig. 5A). In contrast, moderate positive correlation coefficients ($R < 0.8$) were detected in D17, D18, D22, D24, D26, D40, and D45 (see Figure 7). Geographical conditions appeared to play a major role in governing the correlation coefficients of satisfaction levels. For instance, the Donmeang District Office (D6), Din Daeng District Office (D7), Dusit District Office (D8), Taling Chan District Office (D9), and Thawi Watthana District Office (D10), which are situated in similar areas, indicated extremely high correlation coefficients greater than 0.9. Interestingly, the Bang Khen District Office (D17), Bang Kho Laem District Office (D18), Bang Bon District Office (D22), Bang Rak District Office (D24), Vadhana District Office (D40), and Sai Mai District Office (D45) revealed comparatively moderate positive correlation coefficients ($R < 0.8$), as displayed in Figure 8. Given that these BMU districts (i.e., D17, D18, D22, D24, D26, D40, and D45) are located in suburban regions with different locations (see Fig. 1A), these findings again indicate the importance of position as the main factor controlling correlation coefficients of respondents' satisfaction levels.

Further attempts to evaluate the Pearson correlation coefficients observed at the 27 BMA units are conducted and illustrated in Fig. 5B. For instance, the Finance Department (U1), BMA Budget Department (U2), Strategy and Evaluation Department (U3), and BMA Training and Development Institute (U7) have extremely strong positive correlation coefficients with BMA Law and Litigation Department (U8), Administration and Registration Office (U9), Internal Audit Office (U10), Personnel Office (U11), and International Affairs Office (U12). It is interesting to emphasize that the job description is a key factor governing the correlation coefficient. In other words, similar job responsibilities and duties reflect an equivalent level of service satisfaction. For instance, U1, U2, and U3 are deeply connected with financial arrangements, whereas U8, U9, U11, and U12 are profoundly associated with regulations and human resource management. In contrast, U13–U16 have moderately positive correlation coefficients, with
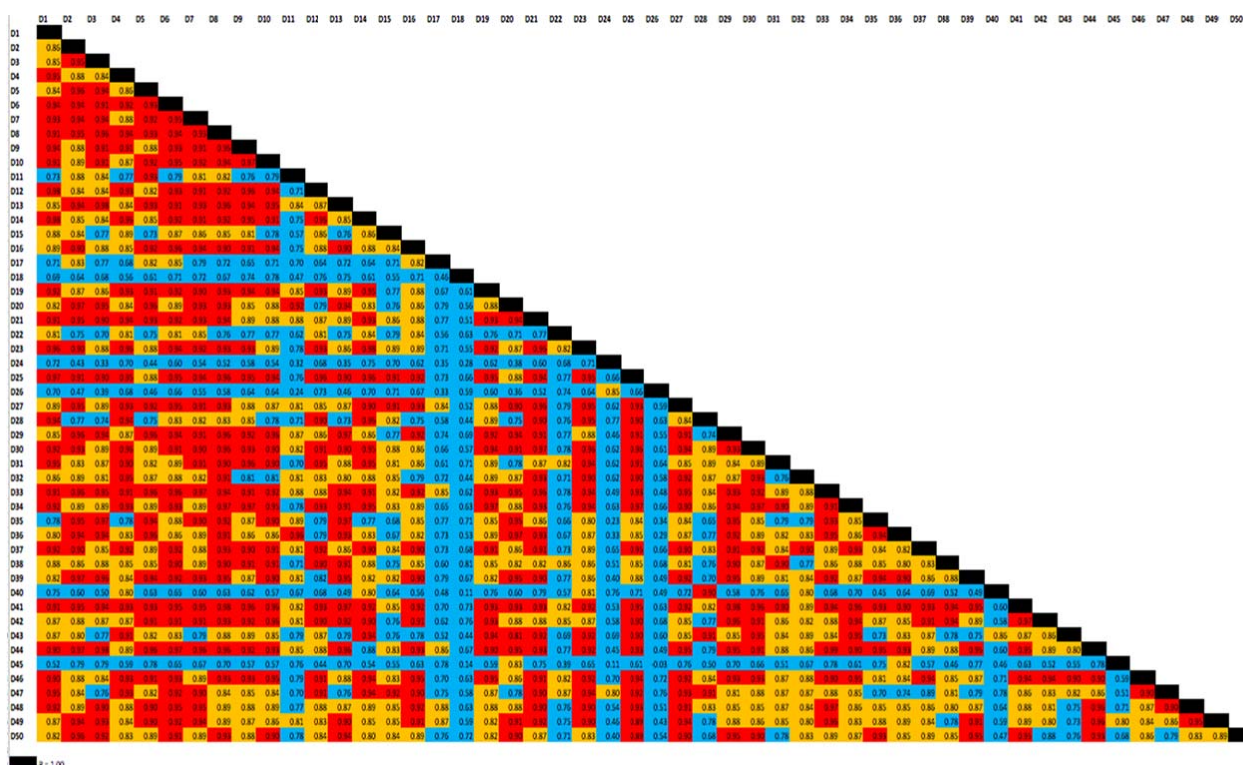
Figure 7. Pearson Correlation Coefficients of Respondents' Satisfaction Level Towards the
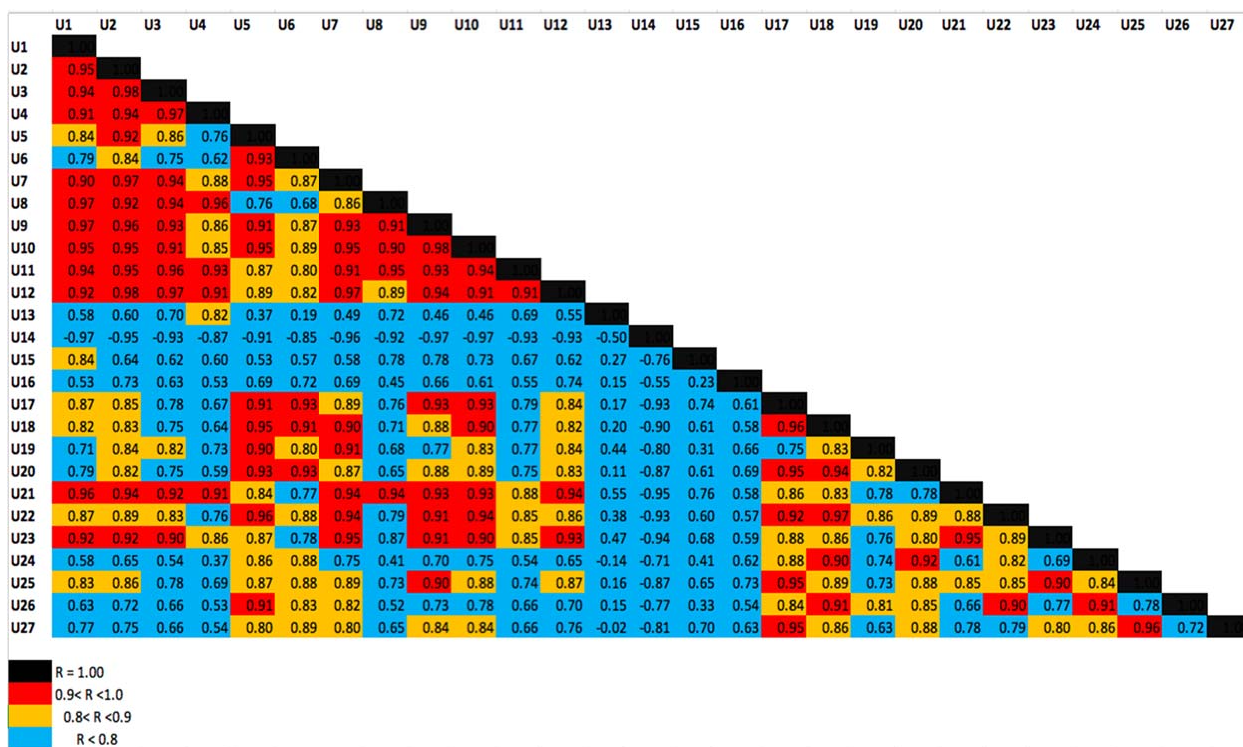Service Quality of 50 BMA District Staff

Figure 8. Pearson Correlation Coefficients of Respondents' Satisfaction Level Towards the
Service Quality of 27 BMA Office Staff

R-values of less than 0.8 (see Figure 8). These findings reveal that the satisfaction scores related to public relations, inspection, permanent secretary, and education have lower affinities in comparison with other features, such as financial services and human resource management.

Conclusion

To achieve UN-SDGs, it is crucial for BMA to investigate factors affecting satisfaction levels of stakeholders associated with the service quality. Based on numerous advanced statistical techniques, it appears reasonable to conclude that BMA government officers tend to cast a critical eye on their colleagues' performances in comparison with other external stakeholders. These findings have raised concerns that more internal customer-oriented policies need to be carefully designed and implemented. Because female respondents tend to be more satisfied with the quality of social media governed by BMA than male stakeholders, a gender-specific policy associated with the website and mobile applications needs to be cautiously designed. Although the older stakeholders and regular visitors were appreciably satisfied with the service quality of BMA staff, some highly educated respondents tended to be disappointed with the performances of staff working at the 27 BMA units. It is also worth mentioning that respondents who had longer residence time seem to be dissatisfied with the performances of BMA staff, whereas highly educated people were satisfied with their service standard. In addition, Pearson's *R*-values highlight the importance of location and job descriptions as the two main factors governing the correlation coefficients of respondents' satisfaction levels.

Acknowledgments

Declaration of Ownership

This report is our original work.

Conflict of Interest

None.

Ethical Clearance

This study was approved by the National Institute of Development Administration.

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