IDENTIFICATION OF DEFICIENCIES OF ELECTRICITY CONNECTION CHARGES GUIDELINES

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ABSTRACT: *Complaints on issues and matters related to connection charges are very common for electricity supply utility companies around the world including Sarawak Energy Berhad. In order to identify the areas that can be improved, a mix method of exploratory research has been designed and undertaken rather than a single method of survey. This will ensure a more comprehensive and detailed understanding of the issues from various target groups, and in this case the individual and non-individual customers. In this study, a survey questionnaire was designed to collect quantitative data from a group of internal wiring contractors representing individual customers applying for the connection of supply. The findings revealed that there are areas of improvement for Sarawak Energy Berhad's connection charges guidelines in terms of differentiation of dedicated and shared assets which leads to unfairness to the connecting customers, inconsistency, and non-transparent in charging. Study results were found to be comparable to the previous study on non-individual customers. Issues of the main concerns of both groups of customers are found to be related to the pricing methodology.*

Keywords: connection charges; Sarawak Energy; survey questionnaire; individual customer; non-individual customer

1. INTRODUCTION

Complaints on connection charges issues related to the electricity supply are prevalent throughout the world for electricity supply utility companies such as Sarawak Energy Berhad (SEB), as this involves dollars and cents that customers pay to get connected to the distribution electrical network. SEB is the sole electricity provider for the state of Sarawak in Malaysia, and in order to improve SEB's pricing framework, this study is undertaken. Investigating complaints lodged by customers is crucial as it helps the company to check if the connection cost imposed on the customers is reasonable. The consequences for pricing errors can be a problem, overcharging customers tend to burden customers, and yet undercharging might jeopardize the company's financial standing.

Previously, a survey study on Sarawak Energy Berhad connection charges guidelines (or SEBCCG) was conducted through the Delphi method [1]. For this initial stage, a total of 15 deficiencies were identified. However, the survey was only carried out on groups of participants representing non-individual customers. This group of participants made up of government agencies and associations representing non-individual customers such as shophouses and housing development. The connection charges guidelines should cover both individual and non-individual customers requesting for connection to the SEB grid network. Hence, for a more comprehensive analysis, this study is undertaken, which involved feedback from a group of respondents, representing individual customers.

In this second stage of the study, the results from the first stage are used to construct survey questionnaires to gather information from individual customers on issues related to SEBCCG. A group of internal wiring contractors registered with the company was selected to participate in the survey because they are the group of personnel who represent the individual customers to submit for application for connection of supply.

2. BACKGROUND

a) Sarawak Energy Connection Charges Guidelines

Table 1 summarized the components of SEBCCG, extracted from the current connection charges guidelines [2].

Table 1. Component of SEB connection charges guidelines

Item	Description
High Tension (HT) Intake	No clear guidelines on the charging methodology
High Tension (HT) System	Covers: - Connection to existing HT network - Extension of HT network - Installation of HT transformer Housing and shop houses development: - Capacity charge of RM500/KVA + Actual HT costs (if more than 1km from the nearest HT connection point) Single residential, commercial and industrial premise: - Capacity charge of RM500/KVA + Actual HT charge for HT cost that exceed 300% of the capacity charge + Actual HT costs (if more than 1km from the nearest HT connection point) Government and temporary supply: - Estimated project actual cost
Low Tension (LT) System	Estimated actual project cost

b) The outcome of Delphi Method

The connection charges guidelines cover both individual and non-individual customers requesting connection to the SEB grid network. The initial survey study using the Delphi method [1] involved only responses from non-individual customers, comprising of participants from government agencies and associations representing non-individual customers such as shophouses and housing development. The initial findings revealed that there are 15 deficiencies, as shown in Table 2.

Customers of SEB also comprise of individual customers, hence their feedbacks are significant in resolving the issues of connection charges. In this study, about 278 respondents were targeted to participate in the study. Due to the fact that this group involves a large number of participants, the Delphi method is no suitable to be used. Hence, the survey questionnaire method was employed.

Table 2. Delphi method findings on SEB connection charge guidelines deficiencies in ascending order

Ranking	Description
1	Inconsistent treatment of charging
2	Inconsistency in the charging
3	Difficult to budget for connection charges
4	Positioning of substation
5	Inconsistent charging of shared and dedicated asset
6	Manipulating of the applied load
7	Different customers make a different contribution to shared HT System Development (11KV and below)
8	Land for substation
9	Change of Policies/Regulations
10	Complexity and transparency
11	Channel for appeal
12	Time frames for approvals of application
13	Inconsistent / Unclear process for assessing the application
14	Cost increases driven by SEB
15	No clear guidelines on assisting the disadvantaged customer

3. RESEARCH METHODOLOGY

A survey is defined as a research method used for collecting data from a group of pre-defined groups of respondents to gain information and insights on a topic. It is commonly used if the study requires the gathering of data from a large population as it is simple and is self-administered by the respondents. However, self-administered surveys are commonly associated with low response rates in comparison to interviewing surveys [3]. Thus, to improve survey response rates, multiple methods were employed.

a) Survey Methods

In this study, the survey was conducted both online and offline. An online survey is a method that has been used in a variety of systematic studies [4] and was found to be an acceptable method to carry out a survey. It has the advantage of minimizing cost and substantially reduced wastage of paper [5].

b) Sample Design

The respondents in this survey study only involved the group of certified internal wiring contractors registered with SEB. They are the licensed contractor appointed to represent the individual clients to deal with SEB on the application of a new supply connection for a single premise (residential, commercial, and industrial). They were chosen to carry out the survey questionnaire instead of the individual customers because not all the customers are familiar with SEBCCG and their customers' supply application is handled by this group of certified internal wiring contractors. If the survey is to be undertaken by the customers themselves, the survey results may not be accurate and valid.

A total of 278 certified internal wiring contractors are registered with SEB. All subjects were included in the survey as the number were manageable. Thirty participants were selected for the pilot study and thus only the remaining 248 of them were involved in the final study. The minimum number of feedbacks required from the respondents for this study was 122. This figure was determined through a sample calculator developed by Gert Van Dessel [6], based on a margin of error of 6.35% and a confidence level of 95%. The margin of error of 6.35% was calculated based on the population size of 248 using the formula $1/\sqrt{N}$ where N is the population size under study [7]. This formula is particularly useful for the population between 10 to 10,000.

c) Pilot Study

A pilot study is commonly used to test a preliminary version of a research instrument that might provide an indication of whether a proposed instrument is inappropriate or too complicated [8]. The pilot study involved 30 certified internal wiring contractors registered with SEB. They were randomly selected from the list of the 278 certified internal wiring contractors. From the 30 participants, 14 were from Kuching, eight of them from Sibu, and four Bintulu and Miri respectively. These contractors were not included in the final survey questionnaire and thus serve as an appropriate pilot setting.

The 30 respondents were briefed on the objective of the survey by phone prior to sending them the survey questionnaires. The survey questionnaires were sent to the respondents through emails (online survey link) as well as hard copies through the drop-off method and the respondents were able to respond through emails or hard copies of the questionnaires. Reminder emails were sent to the respondents on a weekly basis for those yet to respond. There was no deadline set for returning the questionnaires, but all respondents were recommended to return within four weeks.

The questionnaires were well accepted by the respondents. However, it was found that some of the respondents were unclear or not familiar with SEBCCG and many questions were put forward by the respondents when answering the questionnaires. It was thus decided to include an additional section within the questionnaire to test the respondents some basic knowledge of SEBCCG, which is compulsory to be filled by the respondents. Respondents that did not get the right answer for all the questions in this section were excluded from the analysis.

It was also noted that a 100% on-time response rate shown by the respondents where the questionnaires were hand-delivered to them. It was thus decided that all the questionnaires be sent through the drop-off method as the primary method. The online method was only sent to the respondents upon request.

d) Questionnaire Design

The questionnaire was constructed based on the information derived from the finding of the Delphi method as shown in Table 2. It comprised of four sections, namely 1) demographic information, 2) general knowledge of SEBCCG, 3) general issue faced on implementing connection charges guidelines, and 4) strategies/proposal for improvement to SEBCCG. The questionnaire was prepared in English as it is the common language used among the contractors and Sarawak Energy employees. The CheckMarket Support software was employed to design the online survey based on the same questionnaire used in the drop-off survey method only with a slightly different layout. The questionnaires used in the pilot study only consisted of three sections namely demographic information, a general issue faced on

implementing connection charges guidelines, and strategies/proposals for improvement to SEBCCG. The section on general knowledge of SEBCCG was added based on the findings of the pilot study.

Three types of measurement scales, namely nominal, ordinal and interval were employed in this survey. A nominal scale is simply a placing of data in a category without any order or structure such as gender or status of employment. This type of scale is used solely for identification purposes [9]. An ordinal scale deals with no specific distance between one rank and another such as income groups. The interval scale was the main scale employed in this questionnaire. It is mainly used to measure respondents' attitudes and opinions towards certain issues raised and this can be also called a Likert scale [8]. A four-point Likert scale is selected to rate the impact of each issue using a 4-point Likert scale, ranging from 1 (least/no impact/priority) to 4 (high impact/priority). Similarly, to the proposed mitigation measures, they were also being rated by the participants using a 4-point Likert scale, ranging from 1 (least/not useful) to 4 (most useful).

The survey questionnaire has four sections. Section 1 of the questionnaire was designed to gather demographic information on the details of the respondents such as age and company type and size. Type of projects handled is particularly important in this survey as different types of projects handled may correspond to different responses towards SEB connection charges ie housing development project (Non-individuals) and single premise project (individuals). Section 2 test the general knowledge of the respondents on SEBCCG. There was a total of five questions set.

Section 3 consisted of 15 questions, which required the respondents to give feedback on the common issues faced when implementing/understanding SEBCCG. Section 4 consisted of 10 questions and was designed to gather information and feedback from the respondents on their opinions on how SEBCCG could be improved.

The initial survey questions were developed, and its content validity was evaluated by a group of four SEB personnel which comprises one manager and three engineers. This personnel is well versed in SEBCCG.

e) Data Collection Procedures

In preparation for the distribution of the survey questionnaire, the researcher made telephone calls to all the respondents two weeks before implementation. Respondents were informed on the objectives of the survey prior to sending out the survey questionnaire to them through post, hand-delivered, email, or access online, depending on the respondents' preferences. All respondents' details were kept confidential and anonymous. The questionnaires were returned within four weeks. Reminder emails were sent to the participants on a weekly basis for respondents yet to feedback. Of the 248 participants, 171 of them opted for the drop-off method, while 58 opted for the online survey. The remaining participants have no preferences and hence send through the drop-off method.

The first survey commenced in November 2017 by first sending out the survey questionnaires to 190 participants by hand. All survey forms were successfully delivered in 2-week time. A total of three (3) follow-up reminders were sent via email and through phone calls to the participants in the first, second, and third weeks. One week is considered to be an appropriate interval of time to remind the respondents to attempt the questionnaires [10]. The phrasing of the reminder was carefully worded to convey the importance of the survey and appreciation was shown to the respondents who had already participated.

For respondents that opted for an online survey, the survey link was emailed to the respondents in December 2017. Three reminders were sent weekly via emails. The same survey link was attached in these emails to keep reminding them about the questionnaires. This is because reminders about an online survey are expected to reduce the respondents' tendency to postponing and totally forgetting to complete the questionnaire [11].

f) Data Analysis

The data collected from both drop-off and online methods were analyzed using IBM SPSS (Statistical Package for the Social Sciences). Data from the drop-off survey method was manually coded and entered in the IBM SPSS data file. On the other hand, data from the online survey was available in a spread-sheet. Data from both methods then was combined in a data file for data analysis purposes.

Data cleansing was done to filter out those data that were incomplete or did not answer correctly the questions in section 2 on the general understanding of SEBCCG. The cleansed data was mainly analyzed using descriptive statistics, correlation, ranking, and comparison.

Descriptive analysis, included details on the frequency, mean, median, and standard deviation (SD), which was used to describe the background of each respondent such as his/her demographic and socio-economic status. The responses from all the respondents were compiled and the mean of each question was calculated and was ranked according to the descending order.

4. RESULTS & FINDINGS

The analysis of the survey (a combination of data from the drop-off and online surveys) is presented in this section. The findings from both methods were combined for data analysis purposes. All the processes involved in the data analysis with regards to the responses obtained, data screening, non-response bias analysis, and background of the respondents were discussed here. In this paper, only the findings on key deficiencies of SEBCCG is presented.

a) Response Rate

The survey was designed to collect data responding to the above questions. A total of 248 contractors were targeted to participate in the survey and a total of 152 returned the completed questionnaire for a response rate of 61.3%. However, 12 surveys were not used due to unreasonable answers, thus 140 completed questionnaires were analyzed. The response rate for both drop-off and online surveys is shown in Table 3.

The responses received were 152, after the pre-data analysis checking on the survey received, 12 of the responses were unusable due to unable to answer all the questions in Section 2. A total of 140 responses were used for further analysis. This number met the minimum required response of 122 for a margin of error of 6.35% and a confidence level of 95%. In

addition to this, the 140 responses yielded a response rate of 56.5%, which was being considered good [12].

Table 3. Sample sizes and response rate for both drop-off and online surveys

	Drop-Off Survey	Online Survey	Total
Gross Sample Size	190	58	248
Responses	120	32	152
(-) unusable responses	7	5	12
Net	113	27	140

b) Demographic data

The survey collected demographic data, including the company size, the company base, the project nature of the submission, the submission methods as well as the reason for choosing the type of submission. The result is shown in Table 4. The Majority of the respondents (96.4% or 135 respondents) have a company size of not more than 20 employees. On top of that, 95% (133) of the respondents handle submission application for single premise dwelling units and installation of meter only. This thus confirmed that the responses provided would give a clear representation of the problems faced by single premise customers on SEBCCG.

It is also noted that the majority of the respondents (95.71%) preferred to submit their clients' application by hand as they were in the opinion that the application can be processed faster (51.4%) as well as to reduce the risk of loss of documents (39.3%).

Table 4. Demographic information of survey questionnaire respondents

Demographic information	N	%
Company Size		
< 5 employees	61	43.57%
5 - 20 employees	74	52.86%
21 - 50 employees	5	3.57%
> 50 employees	0	0.00%
Project Nature		
Development projects	7	5.00%
Single premise dwelling units	113	80.71%
Government projects	0	0.00%
Installation of meter only	20	14.29%
Location Base		
Kuching	65	46.43%
Sibu	32	22.86%
Bintulu	19	13.57%
Miri	24	17.14%
Submission Method		
Hand delivery	134	95.71%
By post	6	4.29%
Reason		
More convenient	7	9.28%
Reduce the risk of loss of documents	55	39.29%
The application can be processed faster	72	51.43%
Others	0	0.00%

c) Deficiencies of SEBCCG

Respondents were required to provide their perceptions on 15 questions related to deficiencies of SEBCCG. The 15 questions were developed from the 15 deficiencies mentioned in Table 2. For the convenience of data analysis with findings of the Delphi method (stage one), the descriptors of Table 5 were used to represent all the respective questions.

Table 5. The descriptors in relation to the questions of questionnaires

Question	Description
1	Inconsistent treatment of charging
2	Inconsistency in the charging
3	Difficult to budget for connection charges
4	Positioning of substation
5	Paying higher capacity than required / Shared network being funded by developer
6	Inconsistent charging of shared and dedicated asset
7	Manipulating of the applied load
8	Land for substation
9	Change of Policies/Regulations
10	Complexity
11	Channel for appeal
12	Time frames for approvals of application
13	Inconsistent / Unclear process for assessing the application
14	Cost increases driven by SEB
15	No clear guidelines on assisting the disadvantaged customer

The respondents' perception of the impact of each issue towards contributing to the high dissatisfaction among customers is summarized in Table 6. It is obvious that pricing methodology is of major concern to the respondents and has a major impact on the single premise customers. The top six issues in the list are all pricing methodology related matters. Two of the pricing methodologies issues, namely "cost-driven by SEB" and "Complexity and Transparency" were ranked the second last and the last in the issues ranking list.

Table 6. The compiled result of survey questionnaires on SECCG issues in ascending order

Rank	Score	Description
1*	3.5	Inconsistent treatment of charging
2*	3.35	Inconsistency in the charging
3*	3.3	Difficult to budget for connection charges
4*	3.3	Manipulating of the applied load
5*	3.2	Paying higher capacity than required
6*	3	Inconsistent charging of shared and dedicated asset
7	2.6	Positioning of substation
8	1.8	Change of Policies/Regulations
9	1.7	Land for substation
10	1.7	Time frames for approvals of application
11	1.7	No clear guidelines on assisting the disadvantaged customer
12	1.5	Channel for appeal
13	1.5	Inconsistent / Unclear process for assessing application
14	1.5	Cost increases driven by SEB
15*	1.3	Complexity

d) Comparison with Delphi Method findings

Two types of surveys were undertaken on different groups of personnel representing different groups of customers and the ranking result of the two surveys was reiterated in Table 7.

Based on the findings from the Delphi method and survey questionnaire, both studies showed a similar ranking result

although the feedbacks were from two different groups of customers. Six out of seven pricing methodology deficiencies were ranked within the top ten in the ranking list.

Table 7. The ranking results of deficiencies of SEBCCG of both Delphi method and survey questionnaires (* represents issues related to pricing methodology)

Description	Delphi Rank	Survey Rank
*Inconsistent treatment of charging	1*	1*
*Inconsistency in the charging	2*	2*
*Difficult to budget for connection charges	3*	3*
Positioning of substation	4	7
*Paying higher capacity than required / Shared network being funded by developer	5*	5*
*Inconsistent charging of shared and dedicated asset	6*	6*
*Manipulating of applied load	7*	4*
Land for substation	8	9
Change of Policies/Regulations	9	8
*Complexity	10*	15
Channel for appeal	11	12
Time frames for approvals of application	12	10
Inconsistent / Unclear process for assessing the application	13	13
Cost increases driven by SEB	14	14
No clear guidelines on assisting the disadvantaged customer	15	11

All the seven issues related to the pricing methodology listed in Table 7 were analyzed and were further grouped into three different categories as shown in Table 8.

Table 8. The grouping of ranking results of deficiencies of

Description	Deficiencies in pricing methodology
Treatment of applied load	- Manipulation of the applied load - Inconsistent treatment of charging
Differentiation of shared and dedicated asset	- Paying higher capacity than required/shared network being funded by developer - Inconsistent charging of shared and dedicated asset
Variation of charges	- Inconsistency in the charging - Difficult to budget for connection charges - Complexity and transparency

SEBCCG related to pricing methodology

5. SUMMARY & DISCUSSION

The survey questionnaire findings reflected the issues faced by individual customers on SEBCCG. The result of the survey questionnaire was compared with the previous study using the Delphi method [1]. The findings from the Delphi method reflected the issues facing non-individual customers. Although these two studies were conducted on a different group of customers, the findings of both studies are comparable. Both groups identified similar deficiencies in SEBCCG. Apparently, issues of the main concerns to both groups of customers are related to SEBCCG pricing methodology.

Both studies raised the issue of variation in HT/LT charges across regions. Besides that, from the surveys, the respondents also confirmed that SEBCCG were inconsistent in charging customers on the nature of asset, be it a shared asset or a dedicated asset. It was also found that there has been inconsistency in charging the customers where the charges show no clear relationship from the load applied for connection.

6. CONCLUSION

The findings of the survey questionnaire study validated the findings of the Delphi study on SEBCCG. Three deficiencies were found and shall form the basic factors for consideration while reviewing SEBCCG to ensure a fairer and more transparent SEBCCG.

7. REFERENCE

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