Sixth International Conference on Construction in the 21st Century (CITC-VI)
"Construction Challenges in the New Decade"
July 5-7, 2011, Kuala Lumpur, Malaysia

Network – Based Bill of Quantities (NetBOQ) vs Conventional Bill of Quantities: A Comparative Evaluation

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Abstract
Used in one form or the other in the cost management of construction projects all over the world, the issues of format, content, and practicability have remained major criticisms of the conventional bill of quantities, hence the objective of evaluating the suitability of different bill types in this work. The above criticisms become serious when viewed against contemporary clients' increasing demand for, among other things, better accuracy, predictability of project time and cost, process transparency, and better value for money expended for professional services. Using data sourced from experts in bill preparation and use, this paper shows that a network-based bill of quantities is better suited to perform the basic functions of a bill, and for meeting clients' needs since it makes time explicit, and its content follows real life construction sequence.

Keywords: Network-based Bill of Quantities, Conventional Bill of Quantities, Comparative Evaluation, Bill Function

Introduction
The bill of quantities (BOQ or bill) remains a common but major and "classical" tool for cost management of construction projects/contracts in many economies of the world (Hoare and Broome, 2001; The World Bank Group, 2004).
However, the historical development of the use of the bill (Symmonds, 1995; Seeley and Winfield, 1999) derives from clients' dissatisfaction with the initial "measure and value" system of settling the price (cost) of executed construction work- a concern for a 'method'.
The bill of quantities has been defined severally including that it is a schedule that sets out the quantities and quality of all items required to construct work in accepted units of measurement in a logical and recognized (not strictly precedence) order (Wheeler and Clark, 1992). That the bill is used for choosing a contractor and settling the price (Murdoch and Hughes, 1996) is therefore an over-simplification of the bill's numerous functions (Wheeler and Clark, 1992) the number of which varies within the literature (Hughes, 1981; Jagboro, 1992; Murdoch and Hughes, 1996). It is probably based on the multiple functions required of the bill's criticisms can best be appreciated. In the above direction, and more relevant to this paper, are the criticisms of practicability (Netto, 2004), appropriateness of format and content, tendency for

claims which generate disputes, absence of a direct time element and hence payment uncertainty (Hoare and Broome, 2001).

It is in the above direction that this paper sees the need to review the tools used in meeting emerging client requirements and supply chain management needs (Wali et al, 2003; Waterhouse, 2002), one of the which tools is the bill of quantities, hence the need to determine the extent to which available bills compare with a network-based bill in fulfilling bill functions.

Theoretical Framework

As a heavily overloaded term the meaning of 'network' differs (Brandes and Erlebach, 2005), hence "it can refer to an informal concept describing an object composed of elements and interactions or connections between these elements". It has also been seen as a system of intersecting lines or channels (Hornby, 2006). In applied graph theory, a network is viewed as a diagraph with weighted edges and therefore used in the study of diverse structures including project plans (Brandes and Erlebach, 2005). It is also considered a useful concept in mathematical analysis as exemplified by Diestel (2010).

On the other hand the earlier mentioned "measure and value" system (Symmonds, 1995) implicates cost/financial management as the theoretical function of the bill of quantities. Notwithstanding the different perceptions of the bill (Choudhury, 2003; Netto, 2004; Wheeler and Clark, 1992; Pink Software Incorporated, 2004; Seeley and Winfield, 1999)there can generally be two ways of differentiating bills – by reference to the level of completeness for tendering purposes and hence for pricing the work, and by reference to format as basis for aggregating the items of work. The first approach produces three bills namely, the bill of approximate rates/quantities; fully measured bill; and bill without quantities or schedule of rates (Murdoch and Hughes, 1996), all used in different circumstances. The second approach should ordinarily produce seven bill formats, but four formats can be said to be distinct.
The first three formats namely, trade; work section; and sectionalized trade bills, can for convenience, form one type based on close format similarities, and basic content. The last type simply splits the work into functional elements, and normal trade order is then followed. The next type is the elemental bill which is divided into building elements instead of normal work sections, and within each element work is billed in order of work section or building sequence.

Following the elemental bill is the operational bill which divides work into site operations with an operation defined as the work done by a man or gang of men at some definite stage in the building process (Jagboro, 1992). The operational bill tends to describe labour and sometimes plant, requirements in terms of operations required with a schedule for each operation. Lastly, is the activity bill, which is a development of the operational bill, which presents work without splitting work items into labour, and materials. Although its sections are derived from a network analysis, the separation of on-site, off-site activities, special equipment/components and the use, sometimes of a separate bill for grouping nominated contractors' work strongly incapacitates this bill type.
Since the aggregation of every other bill content is based on 'activity' as an element of work in the work breakdown structure of a project (Schwalbe, 2004), the bill's naming rationale is defeated. The absence of the time indices of a network analysis remains another serious defect of the activity bill which informed the network-based bill of quantities (table 1) as developed by Ogbonna (2007). The Network-based bill of quantities is therefore a bill whose contents and content order are derived from, and identified using, the network analysis conventions and following actual construction work order.

Table 1: Network-based BOQ Model/Format

Activity (i - j)	**Item No.**	**Description**	**Time Values**						**Qty.**	**Unit**	**Rate**	**Total cost**
			D	ES	EF	LS	LF	CPI*				

i-j = activity identity; D = activity duration; ES = earliest start time; EF = earliest finish time; LS = latest start time; LF = latest finish time; CPI* = critical path indicator.

Methodology

The specific problem, and "comparative case-based reasoning" (Powell, 1998) approaches have been used for the study. The research objective is to compare the utility level of the NetBOQ and those of the major conventional BOQs in terms of performing the seven BOQ functions identified in the literature.
Data was collected via a questionnaire responded to by quantity surveyors as the target population, and as the professional group that ideally prepares, and are experts in the use of the BOQ. The questionnaire contained a description/model of the NetBOQ as well as question items on functions of the BOQ.

A purposive sample derived from a national workshop organized for quantity surveyors in Nigeria was used. Three hundred (300) questionnaires were distributed using a randomized attendance list, 149 were returned (49.67% return rate) while 111 were however found to be properly filled and hence used for the analysis. Based on a maximum value of 100%, the respondents rated the extent to which the different BOQs can fulfill the seven earlier identified functions.
The analysis of variance (ANOVA – with replication for two variables of classification), and the Duncan Multiple Range Test (DMRT) were used to analyze and report the data.

Results and Discussion

Analysis of the data using the ANOVA technique provided the reported values for bills, and functions as shown in table 2

Table 2: 2- ANOVA Result for Performance of Functions

Source	DF	SS	MS	F	Pr > F
Bill	4	406771.31	101629.8	223.07	< 0.0001
Function	6	13833.00	2305.50	5.06	< 0.0001
Bill – Function	24	16531.81	688.83	5.51	0.0525
Error	3850	1755136.04	455.88		
Corrected Total	3884	2192272.17			

The values in table 2 show a significant difference among the bills (F = 223.07), and the functions (F = 5.06), respectively. Similarly, the Duncan Multiple Range Test (DMRT) (table 3) shows a significant difference in the bills based on their mean scores except for bills 3 and 4 which have the same letter grades (D). The result for the two bills, in particular, tallies with the position in the literature which itself shows that the latter bill is a very close modification of the former.

Table 3: DMRT Result for Bills

Bill Type	Mean	Duncan Grouping
5	86.90	A
2	75.61	B
1	64.43	C
3	60.88	D
4	60.36	D

In terms of performance of functions, the DMRT result in table 4 indicates that a difference exists based on the mean scores whose closeness suggests inter-relationship between functions, in real practice. The mean value of 72.43, and a letter grade of A, invests bill 5 (NetBOQ) with the best performance capacity.

Table 4: DMRT Result for Functions

Bill Type	Mean	Duncan Grouping
7	72.43	A
6	71.43	B A
4	70.05	B A C
3	69.80	B A C
5	69.61	B C
1	67.49	D C
2	66.63	D

Summary and Conclusion

Against changing client requirements, supply chain management needs and increasing construction business and project failure rate, this paper noted the bill of quantities as a classical but common tool for cost management of construction projects in many parts of the world. It reviewed the inadequacies of the conventional bills of quantities in performing basic bill functions especially when viewed against clients' increasing need to know the quantum, and timing of project cash flow as well as checking over-, and under-valuation of work-in-progress. The paper, in particular, highlighted the absence in conventional bills of a direct time and real-life order of contents in the said bills. The paper compared the conventional bills with a network-based bill in terms of functions. Using data from quantity surveyors, as experts in the production /use of the bill, it was found that these experts considered the network-based bill as having the best capacity to perform the basic functions of a bill of quantities.

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APPENDIX

PERCENT RATING FOR BILLS AND FUNCTIONS

S/No	f11	f12	f13	f14	f15	f21	f22	f23	f24	f25	f31	f32	f33	f34	f35	f41	f42	f43	f44	f45	f51	f52	f53	f54	f55	f61	f62	f63	f64	f65	f71	f72	f73	f74	f75
1	80	85	90	60	80	65	70	80	60	60	50	80	80	80	85	60	80	50	50	85	40	90	50	50	50	50	70	60	65	60	70	70	60	50	60
2	95	95	90	90	100	95	98	90	80	100	90	95	80	80	95	80	100	85	80	100	90	95	80	80	95	80	95	85	85	100	80	90	80	90	100
3	95	95	95	90	100	95	98	95	90	100	90	95	80	80	90	80	95	85	80	95	90	95	85	80	95	80	95	80	85	100	90	95	75	90	100
4	90	90	80	80	90	80	90	70	70	80	60	90	75	70	90	90	90	70	70	90	60	100	70	70	90	70	80	70	70	90	80	80	70	70	100
5	80	90	80	70	100	80	90	70	70	100	85	100	70	70	100	70	95	80	75	100	70	95	70	75	100	70	100	70	20	100	70	100	90	90	100
6	90	95	85	90	100	90	98	90	80	100	90	95	80	85	90	80	100	85	80	95	80	95	80	80	95	80	95	80	80	95	85	95	85	80	95
7	90	100	100	100	90	100	100	100	100	90	100	100	100	100	95	100	100	100	100	100	95	100	100	100	85	100	100	100	100	95	90	100	100	100	90
8	95	95	95	90	100	95	98	95	90	100	90	95	80	80	90	80	95	85	80	95	90	95	85	80	95	80	95	80	85	100	90	95	75	90	100
9	80	90	80	70	100	80	90	70	70	100	85	100	70	70	100	70	95	80	75	100	70	95	70	75	100	70	100	70	70	100	70	100	90	90	100
10	30	30	40	40	80	30	35	40	40	80	45	50	45	40	75	45	55	45	30	80	40	50	50	40	60	45	60	40	40	80	40	60	35	40	70
11	90	90	70	70	90	90	70	70	70	90	90	90	90	90	9	90	90	90	70	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
12	90	95	85	90	100	90	98	90	80	100	90	95	80	85	90	80	100	85	80	95	80	95	80	80	95	80	95	80	80	95	85	95	85	80	95
13	90	90	70	80	100	90	90	70	60	100	80	90	80	70	100	70	95	80	80	100	80	95	80	75	100	80	95	85	70	100	80	95	90	80	100
14	90	90	70	80	100	90	90	70	60	100	80	90	80	70	100	70	95	80	80	100	80	95	80	75	100	80	95	85	70	100	80	95	90	80	100
15	50	80	60	65	85	40	85	55	50	60	40	85	55	50	70	40	85	50	50	80	50	80	50	50	60	60	80	50	60	80	60	80	50	50	80
16	90	100	80	80	100	90	100	60	60	100	80	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
17	90	100	80	75	100	90	100	60	60	100	60	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
18	30	30	30	30	40	30	40	30	35	95	30	50	40	40	70	40	50	30	40	80	45	50	30	40	70	40	60	40	45	85	40	60	40	40	80
19	95	95	95	90	100	95	98	95	90	100	90	95	80	80	90	80	95	85	80	95	90	95	85	80	95	80	95	80	85	100	90	95	75	90	100
20	90	90	70	80	100	90	90	70	60	100	80	90	80	70	100	70	95	80	80	100	80	95	80	75	100	80	95	85	70	100	80	95	90	80	100
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22	30	30	30	40	60	30	40	30	40	50	30	50	40	40	70	40	40	40	40	80	45	40	30	40	75	45	50	40	45	85	40	50	40	45	80
23	90	90	30	20	50	90	95	30	30	60	85	90	40	40	70	70	100	30	30	80	80	100	30	30	60	80	60	40	40	80	70	60	30	40	80
24	30	30	40	40	80	30	35	40	40	50	45	50	45	40	75	45	55	45	30	80	40	50	50	40	60	45	60	40	40	80	40	60	35	40	70
25	90	90	70	80	100	90	90	70	60	100	80	90	80	70	100	70	95	80	80	100	80	95	60	75	100	80	95	85	70	100	80	95	90	80	100
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28	30	30	30	30	40	30	30	30	30	40	30	30	40	40	80	40	30	45	45	80	40	50	45	45	60	40	60	40	40	80	40	60	30	30	85
29	20	30	30	25	40	20	30	30	35	65	30	35	30	40	75	40	60	40	30	80	40	50	30	35	60	40	60	40	40	70	40	50	40	30	80
30	90	100	80	75	100	90	100	60	60	100	80	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
31	90	95	85	90	100	90	98	90	80	100	90	95	80	85	90	80	100	85	80	95	80	95	80	80	95	80	95	80	80	95	85	95	85	60	95
32	95	95	90	90	100	95	98	90	80	100	85	95	80	80	95	80	100	85	80	100	90	95	80	80	95	80	95	85	85	100	85	90	80	80	90
33	90	95	85	90	100	90	98	90	80	100	90	95	80	85	90	80	100	85	80	95	80	95	80	80	95	80	95	80	80	95	85	95	85	80	95
34	90	100	80	75	100	90	100	60	60	100	80	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
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37	30	30	30	40	70	30	40	30	40	80	30	50	40	40	70	40	40	40	40	80	45	40	30	40	75	45	50	40	45	85	40	50	40	45	80
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41	30	30	30	30	40	30	30	30	30	40	30	30	40	40	70	40	30	45	45	80	40	50	45	45	60	40	60	40	40	80	40	60	30	30	85
42	20	30	30	25	40	20	35	30	35	45	30	60	40	40	75	40	50	30	30	80	40	50	30	40	60	40	60	40	40	80	40	60	30	40	80
43	90	100	80	75	100	90	100	60	60	100	80	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100

PERCENT RATING FOR BILLS AND FUNCTIONS (cont'd)

S/No	f11	f12	f13	f14	f15	f21	f22	f23	f24	f25	f31	f32	f33	f34	f35	f41	f42	f43	f44	f45	f51	f52	f53	f54	f55	f61	f62	f63	f64	f65	f71	f72	f73	f74	f75
44	30	30	30	30	40	30	40	45	30	50	30	60	40	40	70	40	50	30	30	80	40	50	30	30	70	40	60	40	40	80	40	60	40	40	80
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58	90	100	80	75	100	90	100	60	60	100	80	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
59	30	30	30	40	45	30	40	30	45	50	40	50	40	45	75	40	40	40	40	80	45	40	30	40	70	45	50	45	45	85	40	50	45	40	80
60	80	90	70	70	100	80	90	60	60	100	30	90	70	70	100	65	100	70	70	100	75	100	70	70	100	80	100	70	70	100	70	100	90	90	100
61	95	95	95	90	100	95	98	95	90	100	90	95	80	80	90	80	95	85	80	95	90	95	85	80	95	80	95	80	85	100	90	95	75	90	100
62	30	30	30	30	40	30	40	45	30	50	30	60	40	40	70	40	50	30	30	80	40	50	30	30	70	40	60	40	40	80	40	60	40	40	80
63	90	100	80	80	100	90	100	60	60	100	30	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
64	90	95	85	90	100	90	98	90	80	100	90	95	80	85	90	80	100	85	80	95	80	95	80	30	95	80	95	80	80	95	85	95	85	80	95
65	90	100	80	80	100	90	100	60	60	100	30	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
66	30	30	30	45	40	30	40	30	45	50	40	50	40	45	70	40	40	40	40	80	45	45	40	45	70	45	50	45	40	80	40	50	45	40	80
67	90	95	85	90	100	90	98	90	80	100	80	95	80	85	90	80	100	85	80	95	80	95	80	80	95	80	95	80	80	95	85	95	85	80	95
68	90	100	80	80	100	90	100	60	60	100	30	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
69	80	90	80	70	100	80	90	70	70	100	35	100	70	70	100	70	95	80	75	100	70	95	70	75	100	70	100	70	70	100	70	100	90	90	100
70	45	30	30	45	45	45	40	35	45	45	50	40	40	45	65	45	50	40	45	70	45	40	45	40	70	40	45	50	40	85	45	50	40	40	80
71	80	90	80	70	100	80	90	70	70	100	35	100	70	70	100	70	95	80	75	100	70	95	70	75	100	70	100	70	70	100	70	100	90	90	100
72	95	95	90	90	100	95	98	90	80	100	85	95	80	80	95	80	100	85	80	100	90	95	80	80	95	80	95	85	85	100	85	90	80	80	90
73	95	95	95	90	100	95	98	95	90	100	90	95	95	80	90	80	95	80	80	95	90	95	85	80	95	80	95	85	85	100	90	95	75	90	100
74	30	35	40	30	50	30	35	45	30	50	45	60	45	40	70	45	50	45	30	80	40	50	50	40	60	45	60	40	40	80	40	60	30	40	75
75	30	30	30	40	45	30	40	30	45	50	40	50	40	45	75	40	40	40	40	80	45	40	30	40	70	45	50	45	45	85	40	50	45	40	80
76	20	30	30	25	40	20	35	30	35	46	30	60	40	40	75	40	50	30	30	80	40	50	30	40	60	40	60	40	40	80	40	60	30	40	80
77	30	30	30	30	40	30	40	35	30	50	30	60	40	40	70	40	50	30	30	80	40	50	30	30	70	40	60	40	40	80	40	60	40	40	80
78	30	30	40	40	50	30	35	40	40	50	45	50	45	40	85	45	55	45	30	80	40	50	50	40	60	45	60	40	40	80	40	60	35	40	70
79	80	90	70	70	100	80	90	60	60	100	80	60	70	70	100	65	100	70	70	100	75	100	70	70	100	80	100	70	70	100	70	100	90	90	100
80	30	30	30	30	70	30	30	30	30	80	30	30	40	40	70	40	30	45	45	80	40	50	45	45	85	40	60	40	40	80	40	60	30	30	85
81	30	30	30	45	40	30	40	30	45	80	40	50	40	45	95	40	40	40	40	80	45	45	40	45	70	45	50	45	40	80	40	50	45	40	80
82	30	35	40	30	80	30	35	45	30	50	45	60	45	40	70	45	50	45	30	80	40	50	50	40	80	45	60	40	40	80	40	60	30	40	75
83	30	30	30	30	40	30	30	30	30	60	30	30	40	40	70	40	30	45	45	80	40	50	45	45	60	40	60	40	40	80	40	60	30	30	85
84	90	100	80	80	100	90	100	60	60	100	80	70	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
85	45	30	30	45	95	45	40	35	45	85	50	40	40	45	65	45	50	40	45	70	45	40	45	40	90	40	45	50	40	85	45	50	40	40	80
86	40	35	35	40	90	40	40	30	40	50	50	45	45	45	85	50	50	45	40	75	45	45	50	45	90	45	50	50	40	85	40	50	45	40	80

PERCENT RATING FOR BILLS AND FUNCTIONS (cont'd)

S/No	f11	f12	f13	f14	f15	f21	f22	f23	f24	f25	f31	f32	f33	f34	f35	f41	f42	f43	f44	f45	f51	f52	f53	f54	f55	f61	f62	f63	f64	f65	f71	f72	f73	f74	f75
87	40	30	35	35	75	40	45	35	35	55	50	45	45	40	60	45	50	40	40	65	40	50	45	45	75	40	50	45	45	80	45	45	40	40	85
88	80	90	70	70	100	80	90	60	60	100	80	90	70	70	100	65	100	70	70	100	75	100	70	70	100	80	100	70	70	100	70	100	90	90	100
89	20	30	30	25	70	20	35	30	35	45	40	60	40	40	75	40	50	30	30	80	40	50	30	40	60	40	60	40	40	80	40	60	30	40	80
90	95	95	90	90	100	95	98	90	80	100	85	95	80	80	95	80	100	85	80	100	90	95	80	80	95	80	95	85	85	100	85	90	80	80	90
91	30	30	30	45	60	30	40	30	45	50	40	50	40	45	90	40	40	40	40	80	45	45	40	45	70	45	50	45	40	80	40	50	45	40	80
92	40	35	35	40	80	40	40	30	40	80	50	45	45	45	65	50	50	45	40	75	45	45	50	45	80	45	50	50	40	85	40	50	45	40	80
93	30	30	30	30	40	30	30	30	30	40	30	30	40	40	80	40	30	45	45	80	40	50	45	45	60	40	60	40	40	80	40	60	30	30	85
94	90	70	50	60	90	90	75	60	65	90	80	80	65	60	100	70	80	65	60	100	80	90	60	65	100	85	90	60	65	100	75	90	65	60	90
95	90	100	80	80	100	90	100	60	60	100	80	60	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
96	80	90	70	70	100	80	90	60	60	100	80	90	70	70	100	65	100	70	70	100	75	100	70	70	100	80	100	70	70	100	70	100	90	90	100
97	90	70	50	60	90	90	75	60	65	90	80	80	65	60	100	70	80	65	60	100	80	90	60	65	100	85	90	60	65	100	75	90	65	60	90
98	20	30	30	25	40	20	35	30	35	45	30	60	40	40	75	40	50	30	30	80	40	50	30	40	60	40	60	40	40	80	40	60	30	40	80
99	90	70	50	60	90	90	75	60	65	90	80	80	65	60	100	70	80	65	60	100	80	90	60	65	100	85	90	60	65	100	75	90	65	60	90
100	95	95	90	90	100	95	98	90	80	100	85	95	80	80	95	80	100	85	80	100	90	95	80	80	95	80	95	85	85	100	85	90	80	80	90
101	40	35	35	40	80	40	40	30	40	80	50	45	45	45	65	50	50	45	40	75	45	45	50	45	90	45	50	50	40	85	40	50	45	40	80
102	40	30	35	35	95	40	45	35	35	85	50	45	45	40	60	45	50	40	40	65	40	50	45	45	95	40	50	45	45	80	45	45	40	40	85
103	30	30	30	30	70	30	30	30	30	90	30	30	40	40	90	40	30	45	45	80	40	50	45	45	60	40	60	40	40	80	40	60	30	30	85
104	40	30	35	35	75	40	45	35	35	85	50	45	45	40	60	45	50	40	40	65	40	50	45	45	95	40	50	45	45	80	45	45	40	40	85
105	80	90	70	70	100	80	90	60	60	100	80	90	70	70	100	65	100	70	70	100	75	100	70	70	100	80	100	70	70	100	70	100	90	90	100
106	45	30	30	45	65	45	40	35	45	45	50	40	40	45	100	45	50	40	45	70	45	40	45	40	90	40	45	50	40	85	45	50	40	40	80
107	20	30	30	25	100	20	35	30	35	95	30	60	40	40	75	40	50	30	30	80	40	50	30	40	60	40	60	40	40	80	40	60	30	40	100
108	30	35	40	30	80	30	35	45	30	80	45	60	45	40	70	45	50	45	30	80	40	50	50	40	80	45	60	40	40	80	40	60	30	40	100
109	95	95	90	90	100	95	98	90	80	100	85	95	80	80	95	80	100	85	80	100	90	95	80	80	95	80	95	85	85	100	85	90	80	80	90
110	90	100	80	80	100	90	100	60	60	100	80	100	70	70	100	70	100	80	80	100	80	100	70	70	100	80	100	70	70	100	70	100	90	90	100
111	30	30	40	30	95	40	40	40	30	80	30	60	40	40	70	40	50	30	30	80	40	50	30	30	80	40	60	40	40	80	40	60	30	40	80

Notations:

S/No = serial number of questionnaire respondee

f11 = rating for function 1 on bill 1

f21 = rating for function 2 on bill 1, etc.