Defaulting on Water Utility Bills: Evidence from the Greater Accra Region of Ghana

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Abstract

Water utility companies, especially those operating in low-income countries, write off millions of dollars in bad debts due to nonpayment of bills by customers. Delayed payments and outright non-payments are increasingly constraining utilities' revenue performance and their service provisions. The aim of the present study is to examine the effects of a set of behavioural and institutional factors on the likelihood of defaulting on water bills. Based on a survey of households in the Greater Accra Region of Ghana (GARG), our empirical analysis suggests that an improvement in institutional factors such as monitoring and control measures and behavioural factors such as service quality, service value, and corporate image has a significant effect in minimizing the likelihood of payment default. Other factors considered in the analysis – transaction time, billing issues and customer satisfaction – do not seem to have an effect on estimated default likelihood. We provide detailed discussion and policy implications of our findings.

Keywords: **bill payment default, behavioural factors, institutional factors, Ghana Water Company**

JEL Classification : G32, G34, G39

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In the context of utility companies, bill payment default is the failure of the customers to pay off their bills within a stipulated time after the presentment. Water utility companies almost routinely write off millions of dollars in bad debts due to their customers defaulting on bill payments. It is nerve-racking to see some water utilities passing those bad debts along to the rate payers (as additional costs) who are regular with their payments. For others, the losses are absorbed by the company's shareholders, which invariably affects the returns on shareholders' investment. It is not also uncommon to find customers being disconnected as a consequence of their persistent non-payment of water bills. While regulatory bodies are usually against disconnecting customers from the access to water as a basic necessity, they often will not also permit water utilities to roll their bad debts into the rate structure. Caught in this precarious situation, water utilities face quite a daunting cash-flow challenge to meet their operating expenses and to expand their service coverage. It is ,therefore, a real necessity that the water utilities identify the major factors causing bill defaults so that they can develop appropriate plans to minimize the likelihood of future defaults.

According to a study commissioned by Ofwat (the economic regulator of the UK water industry), the levels of arrears, the amount of written-off revenue, and the number of customers in water debt within the UK water industry have continued to rise since 1998-99 (WaterVoice & Ofwat, 2003). For example, the total household revenue outstanding for up to 48 months for the period from 2002-03 stood at £781 million, an increase of £115 million (17%) since 1998-99. Recent figures from WaterVoice and Ofwat revealed that, on an average, UK water companies are chasing close to UK £763 million per year in outstanding revenue for up to 48 months, of which close to £100 million is eventually written-off as bad debt.

The problem of bill payment default is presumably even worse in low-income countries. In Ghana, although the figure is not available, it is anecdotally believed that the level of bad debt as a result of bill non-payment is putting a lot of financial burden on the government since it has to pay for the revenue shortfalls of the water companies. For instance, in 2007 and 2009, the total budgetary allocation to Ghana Water Company Limited (GWCL) amounted to

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37.5 million Ghana cedis (Ministry of Water Resources, Works and Housing, 2009). Also, in 2012 alone, the government spent GH? 179.7 million on consumer subsidies for water and electricity, a move that effectively suspended a quarterly rate adjustment formula [1] often applied by the Public Utilities Regulatory Commission ("ECG "switches-off" bonds idea," 2013). In view of the preceding discussions, the paper attempts to identify the institutional and behavioural factors that influence the likelihood of water utility customers to default on their bill payment.

Literature Review

In spite of the low-income levels in developing countries, cost recovery through user payments is now widely recognized as a prerequisite for the sustainability of service provisions by the public utilities. The cash flow problem that sets in as a result of customers' delayed payment or outright non-payment would directly affect the utility's ability to meet its operating expenses and extend service coverage. The resulting low service coverage, and potentially poor customer service would add to customer dissatisfaction, which eventually would breed more non-payers and trigger a cycle of poor performance (Mugabi & Kayaga, 2010). In order to deal proactively with this scenario, utility professionals must have an understanding of the factors that affect customers' decision when it comes to paying utility bills in time.

Especially since 1990s, there is a growing body of research on customers' willingness to pay for water services. More recently, Kamaludin, Rahim, and Radam (2013) assessed consumers' willingness to pay for improved domestic water services in Kelantan, Malaysia. Kanayo, Ezebuilo, and Maurice (2013) estimated the willingness to pay for water services in Nsuka area of South-Eastern Nigeria. Ifabiyi (2011) examined consumer willingness to pay for water at the household level in Ilorin, Kwara State, Nigeria. Similar studies were conducted in the town of Negombo in Sri Lanka (Van Houtven, van den Berg, Pattanayak, & Yang, 2006) and the peri-urban area of Mandapam in Coimbatore, India (Venkatachalam, 2006). However, a major limitation of these studies is that their focus was mainly on demographic and socioeconomic factors for an understanding of willingness to pay for water services. Little or no attention was paid to understand the customers' perceptions in service encounters such as service quality, service value, and customer satisfaction, which have received considerable attention in the services literature for an understanding of customer behaviour. In addition, the above-mentioned studies also did not pay careful attention to some of the important institutional factors such as monitoring and control measures by the utility company and billing issues that may also affect customers' decision to pay in time and their actual payment behaviour.

Recently, Mugabi and Kayaga (2010) studied the role of attitudinal factors as well as socio-demographic background in influencing Ugandan water customers' intention to pay and their actual payment behaviour. They showed that much of the effect of socio-demographic factors on customers' behavioural intentions to pay in time is significantly mediated through customers' attitudinal factors. Departing from a majority of the existing studies, Kayaga, Franceys, and Sansom (2004) explicitly modeled the role of customers' judgmental factors such as service quality, service value, corporate image, and customer satisfaction on water customers' attitudinal loyalty and payment behaviour. They found that the behavioural factors play a significant role in determining the average length of time customers' take to settle their water bills.

↳ **Service Quality :** According to Grönroos (1984), service quality is a judgment that a customer makes when they compare their expectations to the perception of the service they have just received. Thus, service quality is the extent to which the service meets or exceeds customer expectations. There seems to be a broad consensus emerging in the services management literature that service quality is a major determinant of overall behavioural intention. For instance, a study by Moss (2007) showed a strong relationship between service quality and repurchase (or behavioural) intentions, especially in the public service sector. Also, interactions between a utility and its customers regarding service outages, emergencies, billing questions, and billing disputes create a certain level of satisfaction among customers, which lead to prompt bill payment (Moss, 2007).

↳ **Service Value :** Based on a review of previous research and on an exploratory study, Zeithaml (1988) defined service value as the customers' overall assessment of the utility of a product based on perceptions of what is received and what is given. Therefore, it represents a trade-off between the customers' evaluation of the benefits of using a

service and their sacrifice (i.e., the monetary and non-monetary costs associated with utilizing the service, and the customers' frame of reference). A study by Kayaga et al. (2004) on water utility customers in Uganda found that service value, together with customer satisfaction, exerts a positive influence on customers' loyalty towards water utilities. Interestingly, service value appears to be the most promising topic in services research due to its suggested direct influence on consumer decision-making. If the value of the services provided is high, consumers are expected to make favourable decisions (or favourable behavioural intentions) when it comes to paying for the services they receive.

↳ **Corporate Image :** Corporate image is the net result of the interaction of all experiences, beliefs, feelings, knowledge, and impressions that people have about an organization (Bernstein, 1984). It is often considered as a function of the accumulation of purchasing or consumption experience over time (Andreassen & Lindestad, 1998) or as a function of the cumulative effect of customer (dis) satisfaction (Fornell, 1992). Dowling (1986) noted that corporate image can be aided by the information provided by the company (communications), as well as managerial attitudes, behaviour, and philosophy. Accordingly, it enables a company to engage more effectively in maintaining and enhancing the relationship with its customers and thereby help improve customers' attitude towards the company. An improved customer attitude is expected to reflect favourably on customer satisfaction and behavioural intentions. In the context of water utility companies of Uganda, Kayaga et al. (2004) could not establish any direct relationship between corporate image and customer loyalty, although they claimed that their unreported exercise suggests that the effect of corporate image is, in fact, mediated through customer satisfaction of the utility clientele.

↳ **Customer Satisfaction :** Most researchers view customer satisfaction as a function of confirmation or disconfirmation arising from discrepancies between prior expectations and actual performance. In other words, consumers hold pre-consumption product or service standards, observe product or service performance, compare performance with their standards, form confirmation or disconfirmation perceptions, and then combine these perceptions with standard levels to form summary satisfaction judgements (Oliver, 1980; Walker, 1995).

In a comprehensive study on the relationship among and between the major consumer judgemental constructs, Cronin Jr., Brady, and Hult (2000) showed that customer satisfaction has a direct relationship with behavioural intentions. Their findings were borne out by the results of several other prior and subsequent studies on customer satisfaction and various indicators of behavioural intentions such as customer loyalty, repurchase intention, switching behaviour (for example, Andreassen & Lindestad, 1998; Caruana, 2002; Srivastava & Sharma, 2013). Therefore, in the context of a utility company, it may be argued that if customers are not satisfied with the service provision, their dissatisfaction will manifest itself directly in their bill payment behaviour. As part of their study on a sample of Ugandan water utility customers, Kayaga et al. (2004) explored the effect of consumer satisfaction on two important indicators of behavioural intention of Ugandan utility customers - attitudinal loyalty and bill payment behaviour. Their findings suggested that customer satisfaction has a direct effect only on attitudinal loyalty, and its effect on bill payment behaviour is completely mediated through customers' loyalty towards the water utilities.

Henkel, Houchaime, Locatelli, Singh, Zeithaml, and Bittner (2006) affirmed that satisfied customers of public utilities have high extent of usage and intentions to repurchase in the future. In an earlier research, Zeithaml (2000) concluded that there is a relationship between customer satisfaction and bill payment, which translates into organizational performance.

↳ **Billing Issues and Payment Behaviour :** Most services are bundles of core, facilitating, and support services (Gr? nroos, 1987) and the water service is no exception. Accordingly, issues relating to tariff setting, meter reading, billing and payment options form an important part of facilitating and support services for water utilities. In an exploratory study of five small urban water utilities in Uganda, Mugabi, Kayaga, and Smout (2007) identified that bill delivery, dependability or correctness of meter reading and bills, clarity of bills, flexibility, and choice in payment options are among the main factors that customers believe to be the facilitators of or barriers to timely payment of their water bills. These issues, that we may collectively term as the billing issues, if not managed properly, may easily add to customer dissatisfaction and eventually lead to more delayed payments (or outright non-payments) and poorer revenue performance for the utility.

Chipofya, Hoko, and Gustaff (2009) argued that utilities do not achieve efficiency in billing because **(a)** bill packages fail to establish customer base, **(b)** bills delivery is irregular resulting in non-payment by registered consumers,

especially in slum areas, **(c)** there are incidences of under-charging and over-charging due to billing errors, which create dissatisfaction among consumers, and **(d)** ineffectiveness of the billing system. Moreover, they suggested that utilities should explore opportunities to hand-deliver bills during meter-readings and also outsource meter readings to subsidiary companies. Turanscala and Erasmus (2007) posited that the prepayment metering system has the potential of solving billing and poor consumer payment behaviour in the context of Africa. At the same time, however, they acknowledged that poor access to meters in remote areas, deposit management problems, comprehension, and lack of trust in fixed charges in a tariff structure, ability to afford fixed costs in a tariff, and lack of postal systems in rural areas where households do not have addresses as well as low staff-customer ratio remain the strategically important indicators for the adoption of prepayment metering system in Africa. Given this reality, utility managers in low-income countries need to be more customer-focused in dealing with the billing issues and relent on their supply-driven business philosophy in order to achieve better customers' bill payment behaviour.

In addition to behavioural and institutional constructs such as those reviewed in the preceding paragraphs, Mugabi et al. (2007) and others (for example, Kayaga, Calvert, & Sansom, 2003;Waldron, 2011) argued that some other institutional factors, namely, transaction time of customers at the bill collection centres and monitoring and control measures on the part of water utilities, may also play critical independent roles in determining customers' satisfaction level and their bill payment behaviour.

Research Objectives

Based on the review of literature in the previous section, it can be argued that the customers' willingness to pay water bills in time and their actual payment behaviour may be influenced by a range of factors; some of which may be viewed as entirely under the control of the utility company (such as the billing issues and monitoring and control activities), some partially under control (behavioral factors such as service quality and service value), and some others completely beyond control (such as the social-demographic profile of the customers). Our goal in this paper is to focus on only those factors that a water utility may influence at least to some meaningful extent. It is our expectation that by paying extra attention to these factors, the water utility companies will be able to deal more proactively with the bill default phenomenon. Thus, the following twofold objectives guide our study:

- First, identifying a set of behavioral and institutional factors that are likely to cause customers to default on payments as and when water bills become due; and
- Second, estimating and analyzing the relative importance of those factors in predicting actual bill payment defaults.

Rationale of the Study

Utility companies are typically businesses with significant credit sales. Therefore, timely collection of payments from the customers constitutes the most critical indicator of these companies' liquidity and future growth potential. Unfortunately, however, most utilities in developing countries are plagued with delayed bill payment and ever increasing arrears, which not only undermine their service delivery, but also threaten their very existence in the face of limited sources of alternative cash-flow streams.

In this backdrop, we draw on the corporate finance literature on credit default in order to understand what makes utility customers to default in their bill payments. As we discuss in detail in the next section, we adopted the logistic regression approach in assessing the effect of a set of organizational and behavioural factors on the likelihood of payment default. While the application of logistic regression in credit default modelling is not new, its application in the context of non-payment of utility bills has not received due attention [2]. We believe that our modelling approach and resulting findings will prove useful in devising a better framework for an effective understanding of the underlying reasons of customer default and thereby help utilities reduce their bad debts that are traditionally adjusted through cross-subsidies [3].

Methodology

Data Source : The data for the study were collected in a cross-sectional survey of 150 households in the Greater Accra Region of Ghana (GARG). For managerial purposes, the GWCL has grouped the region into Accra East, Accra West, and Tema regions. At the time of the study, the total customer population of GWCL in the GARG was 228,165 with Accra East, Accra West, and Tema regions having customer populations of 84,698, 80,582, and 62,885 people respectively. The sampling process is organized in two stages. In the first stage, the Accra East region was randomly selected from the three regions identified for the study. In the second stage, the sample for the study was selected using a systematic sampling technique from the list of households for the chosen region as contained in the utility's database. The sampling technique chosen for the study was appropriate and considered good for a household survey (Cooper & Schindler, 2003). The sample size of 150 respondents is considered appropriate for estimation purposes (Cooper & Schindler, 2003; Hyndman & Kostenko, 2007).

The Questionnaire : The instrument used for data collection was the questionnaire. And since it is not adapted but developed, we conducted a literature review to operationally define the constructs in order to develop their scales. To come up with the first draft of the survey questionnaire, apart from using the literature, we engaged the Customer Service Directorate (CSD) of the GWCL in a focus group discussion, and their suggestions aided the design of the instrument. The questionnaire was sent out for a pilot study with 60 customers of the GWCL in the GARG. The results of the pilot study were analyzed in terms of reliability and factor analysis, on the basis of which the questionnaire was further refined. The reliability assessment of the five (5) scales, customer satisfaction, service quality, corporate image, utility billing, and service value yielded alpha coefficients of 0.877, 0.925, 0.964, 0.867, and 0.953, respectively.

Notably, all the coefficients are higher than 0.7, a minimum level considered as good and acceptable. Construct validity of the scales was established through exploratory factor analysis. Using principal component method, the scales were factor analyzed and subjected to orthogonal rotation in order to produce interpretable dimensions. The questionnaire had a total of 46 items divided into 6 sections: Transaction time and monitoring and control (2 items), quality of service (13 items), customer satisfaction (10 items), corporate image (5 items), utility billing (5 items), service value (6 items), and background information (5 items). The 5-point Likert type scale with classifications from 1(*strongly disagree*) to 5 (*strongly agree*) was used to capture data for the constructs of service quality, customer satisfaction, corporate image, utility billing, and service value. The rationale for using the 5-point Likert scale was to provide an opportunity for the respondents to specify their levels of agreement or disagreement on a symmetric agree-disagree scale for the series of statements for each of the constructs.

Data Collection Procedure : For the data collection, we sent out the questionnaire to the respondents with the help of research assistants in 2012. While the literate respondents filled out the questionnaires themselves, the illiterate ones were assisted by the research assistants to fill out their questionnaire by reading out and explaining the items to them (the respondents). Out of the 150 questionnaires sent out, 122 questionnaires were returned, giving a response rate of 81.33%.

Additionally, we obtained data for the bill payment default, which is the dependent variable of the study, by using 28 days as a threshold to classify the customers. The classification was done by computing the mean bill payment period of the customers for periods ranging from 2010 to 2011. Customers whose mean bill payment period was less than 28 days were not likely to default (non-defaulters). But customers who exceeded the 28 days time frame set by the water utility were more likely to default (defaulters). Therefore, the dependent variable is made dichotomous by classifying customers as defaulters and non-defaulters.

Regarding the demographic characteristics of 122 respondents who answered the questionnaire, 54.26% of the respondents were men, while 55.74% of the respondents were women. 65.60% of the respondents claimed that they were educated, and 34.40% of the respondents claimed that they were uneducated. Furthermore, about 27.05% of the respondents reported that they were aged between 18 - 35 years (young adults), while 55.74% and 17.21% of the respondents reported that they were aged between 36 - 60 years (adults) and above 60 years (elderly) respectively. Majority (54.90%) of the respondents reported that they belonged to the middle income category, confirming the recent World Bank classification of Ghana as a middle income country.

Variable Construction

To estimate the model, we measured the constructs and showed how each can influence customers' payment default. The detailed descriptions of the constructs are given in the proceeding paragraphs for the reader to understand how each of them is measured, especially the dependent variable, since it is regrouped into a nominal outcome variable (defaulters and non-defaulters).

↳ **Bill Payment Default (BPD) :** A payment default is the inability of the debtors to pay back their loan when it is due. In water utilities, it means the inability of a water customer to settle their accounts. Water is sold to consumers on credit in most developing countries, and they are expected to pay for their consumption later ; sometimes, a month in arrears. Therefore, we define bill payment default as the unwillingness or inability of water utility consumers to pay their bills within the stipulated period of payment after presentment. In the context of Ghana, a customer is supposed to pay for their water bill within 28 days after presentment.

To get data for the bill payment default, we used the concept of the bill payment period. The bill payment period was obtained from the water utility's billing database for the period from January 2010 to December 2011. Billings to and payments by respondents for each financial year were extracted. We divided the outstanding arrears at the end of each financial year by the total billings done in the year to obtain a ratio. The ratio obtained thereof was then multiplied by 365 to obtain the values for the bill payment period for 2010 and 2011. By averaging for 2 financial years (or 2 billing cycles), we got the value of the mean bill payment period (MBPP) for each respondent. As explained earlier in the methodology section, the MBPP was then converted to a binary or dichotomous variable. To do this, we used 28 days as a cut-off point for defaulters and non-defaulters because technically, on an average, it is the grace period given to customers to settle their bills after presentment. A customer whose MBPP is over 28 days is considered a likely defaulter and a customer whose MBPP is less than 28 days is not likely to default. According to the GWCL policy, a customer has 28 days within which he/she has to pay his/her bill from the day the bill is issued. Therefore, a customer who does not pay his/her bill within 28 days is more likely to default in payment.

↳ **Transaction Time (TT):** It is the average number of minutes taken by customers to pay their bills in the Greater Accra Region of Ghana (GARG). Some researchers often refer to it as 'travel time'. In constructing the models of the study, individual respondent's transaction time was used as captured in the questionnaire. We expected the variable, transaction time, to have a positive relationship with the bill payment default, which means the longer the time taken by the customers to pay their bills, the higher is the likelihood of their bill payment default.

↳ **Monitoring and Control (MC) :** It is the average number of times in a year that the utility companies' inspection units carry out routine inspections on customers' facilities in the GARG. Kayaga et al. (2003) referred to it as 'inspection times'. According to them, the frequency of inspection times prevents illegal connection, non-revenue water, and ensures frequent bill payment. In this study, we expected monitoring and control to have an inverse relationship with the bill payment default. If it is found significant, it means that it will minimize the likelihood of customers' bill payment default.

↳ **Customer Satisfaction (CS) :** It is a measure of how services supplied by utility companies meet or surpass customers' expectations. The CS is found to have a statistically significant relationship with bill payment (Kayaga, 2002). If customers are satisfied with the services of a utility provider; naturally, they will be more willing to pay for their bills. So, in this study, it is our a-priori expectation that customer satisfaction will reduce the likelihood of bill payment default.

↳ **Service Quality (SQ):** It is a judgment that a customer makes when he or she compares his expectations to the perception of the service he/she has received. It is a measure of customers' expectations of the services of utility companies. In Ghana, customers of utility service providers attach much importance to quality and ,therefore, pay their bills once quality is improved. Therefore, we add this variable to the specified model to see whether it will have a significant effect on the bill payment default. We expect service quality to have a direct but inverse relationship with the bill payment default, which means the better the service quality, the less likely customers will default in their bill payment.

↳ **Corporate Image (CI) :** Corporate Image (CI) is the net result of the interaction of all experiences, beliefs, feelings, knowledge, and impressions that people have about a utility company (Bernstein, 1984). In Ghana, it is generally believed that customers do not have a positive perception about the GWCL, and so are not willing to pay their bills. In his study on Uganda, Kayaga (2002) used corporate image and found it insignificant. In our case, we wanted to use it and see whether or not it will give a different result. This is because, contextually, Ghana and Uganda are two different countries. Corporate image is expected to have a negative effect on the bill payment default, which means that an improvement in corporate image of the GWCL will result in a less likelihood of bill payment default.

↳ **Utility Billing (UB) :** In the context of this study, the UB constitutes tariff-setting, connection fees, metering, and billing. In Ghana, the lifeline tariff is used, which is computed using the marginal cost pricing concept. Bad pricing policies can affect customers' responses to bills to the extent that utility companies offer reasonable prices, clear tariff and invoices for services provided, customers will respond fairly well by paying their bills on time. We, therefore, measured utility billing as the perception of customers about tariff-setting, metering, and billing by utility companies. While a positive perception will result in a reduction in the bill payment default, a negative perception will increase the bill payment default. It is expected that the utility billing index will be negative, which means an improvement in utility billing will reduce the bill payment default of the customers.

↳ **Service Value (SV) :** Service Value (SV) is the measure of consumers' total evaluation of the utility of a product based on perceptions of what is received and what is given. The difference (or trade-off) between what is given and what is received is the value that customers look for in utilities. We expect SV to have an inverse relationship with the bill payment default. This is because, if customers get the value they are looking for in utilities, they will naturally be more willing to pay their bills leading to a less likelihood to default.

Model Specification

In order to examine the relative importance of each of the predictor variables on bill payment default, we used logistic regression since our interest is not a prediction of *Y* as in linear regression, but a probability of a customer defaulting or not defaulting conditions of *Y*, which can take on any value between 0 and 1. In the first step of our model specification, we find the log transformation of the *P* values to a log distribution, which enables us to create a link with a normal regression equation (equation 1).

$$\text{Logit}(P) = \log[P/(1-P)] = In[P/(1-P)] \quad (1)$$

The logit of *P* is the log (to base *e*) of the odds ratio or likelihood ratio that the dependent variable is 1. In the next step, we also show the relationship between the usual regression equation, which is a straight line, and the logistic equation (equation 2).

$$\text{Logit}[P(X)] = \log\left[\frac{P(X)}{1-P(X)}\right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon_i \quad (2)$$

Although equation 2 looks like a linear regression, the principles of the best-fitting equation are entirely different. While linear regression uses least square deviations criterion for the best fit, logistic uses maximum likelihood method, which maximizes the probability of getting the observed results, given the fitted regression coefficients. In the last step, we show how the *P* is calculated, which is basically another rearrangement of equation 2. The equation 3 is the working model in this paper.

$$P = \frac{\exp^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon_i}}{1 + \exp^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon_i}} \quad (3)$$

where,

P = the probability that a customer will default or not default in bill payment;

exp = the base of natural logarithms (approx. 2.718);

β_0 = the constant of the equation;

β_{1-k} = the coefficients of the predictor variables; and,
ε_i = the error term.
$X_1, X_2, X_3, X_4, X_5, X_6$ and X_7 are the transaction time (TT_i), monitoring and control (MC_i), service quality (SQ_i), customer satisfaction (CS_i), corporate image (CI_i), utility billing (UB_i), and service value (SV_i) corresponding to i-th customer in the sample respectively.

Analysis and Results

In this section, we begin with the descriptive statistics, followed by correlation matrix and assessment of multicollinearity using the variance inflation factor and its reciprocal, the tolerance level. We also present the logistic regression results followed by stepwise regression output showing the relative importance of the constructs in the estimation exercise.

Descriptive Statistics : We provide the summary statistics of each of the variables under consideration in Table 1. The mean value of TT shows that a typical water utility customer spends approximately 89 minutes to settle his or her bill at a pay point, which is quite high, and possibly might account for the high likelihood of customer bill payment default. Among the independent variables, the UB shows a moderate amount of dispersion relative to their respective means. The high dispersion of the MC from its mean is not surprising because the minimum and maximum values are 0 and 12 respectively. This suggests that while the water consumption and payments of some customers are monitored 12 times a year, others are not monitored at all.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	CV
TT	122	4.00	180.00	88.8443	54.1125	0.6091
MC	122	0.00	12.00	4.5656	3.1095	0.6811
SQ	122	13.00	60.00	30.8361	11.5375	0.3742
CS	122	10.00	48.00	26.2213	9.6924	0.3696
CI	122	5.00	24.00	13.7951	4.8599	0.3523
UB	122	5.00	24.00	15.2377	4.3467	0.2853
SV	122	5.00	29.00	15.1557	5.7969	0.3825

Note: The TT and MC are measured in minutes and number of times in a year respectively. TT, MC, SQ, CS, CI, UB and SV are transaction time, monitoring and control, service quality, customer satisfaction, corporate image, utility billing and service value respectively (see variable construction section for detailed description of the variables).

In Table 2, we show the strength of linear correlation between the variables. In terms of magnitude, the correlation coefficients are generally very low, except the correlation between CI and CS. Also, while some of the variables are negatively related, others are related positively. The positive correlation between TT and bill payment default (BPD) shows that a unit increase in TT will more likely result in customers defaulting in their bill payment. However, the negative correlation between the BDP and MC, SQ, and CS, for example, shows that any unit increase in any of the variables will result in a less likelihood of customers defaulting in their bill payment.

We also used the correlation matrix to detect the possibility of multicollinearity among the independent variables (Table 2). Notably, except the correlation between CI and CS, which is 0.810, the rest of the correlation coefficients are pretty low. When variables are perfectly or highly correlated with the correlation coefficient very close to 1, it is difficult to assess their independent effects on the dependent variable. Therefore, to alley our fears, we carried out collinearity diagnostics using the variance inflation factor (VIF) and its reciprocal tolerance level for each of the independent variables. The results are presented in Table 3. We find that the VIF values range between a minimum of 1.101 (a maximum tolerance of 0.999) for CI and a maximum of 4.111 (a minimum tolerance of 0.243). Therefore, judging by the popular rule of thumb of a maximum acceptable VIF of 10 (a minimum acceptable tolerance of 0.10),

none of our predictor variables seems to pose any serious threat of multicollinearity to our subsequent regression analysis.

Table 2. Pearson Correlation Matrix

	BPD	TT	MC	SQ	CS	CI	UB	SV
BPD	1.000							

TT	0.472***	1.000						
	(0.000)	----						
MC	-0.114	0.245***	1.000					
	(0.210)	(0.006)	----					
SQ	-0.609***	-0.599***	-0.101	1.000				
	(0.000)	(0.000)	(0.270)	----				
CS	-0.451***	-0.630***	-0.252***	0.729***	1.000			
	(0.000)	(0.000)	(0.005)	(0.000)	----			
CI	-0.525***	-0.671***	-0.169	0.654***	0.810***	1.000		
	(0.000)	(0.000)	(0.062)	(0.000)	(0.000)	----		
UB	-0.340***	-0.547***	-0.138	0.545***	0.575***	0.663***	1.000	
	(0.000)	(0.000)	(0.130)	(0.022)	(0.000)	(0.000)	----	
SV	-0.531***	-0.572***	-0.217**	0.723***	0.724***	0.740***	0.594***	1.000
	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.000)	(0.000)	

Note: (i) *** Correlation is significant at the 1% level (2-tailed).

(ii) ** Correlation is significant at the 5% level (2-tailed).

(iii) The figures in parentheses are the *p* - values.

Table 3. Multicollinearity Diagnostics

	TT	MC	SQ	CS	CI	UB	SV
Tolerance	0.476	0.874	0.356	0.257	0.241	0.520	0.334
VIF	2.100	1.144	2.811	3.898	4.155	1.925	2.993

↳ **Main Logistic Regression Results :** The results of the logistic regression are presented in the Table 4. All the variables, except for CS, have their expected a priori signs. We find that the partial effects of MC, SQ, and CI on the odds of customer default on water bill payment are statistically significant at the 5% level. Although, only weakly at the 10% level, TT and SV also have some significant effect on the odds of customer default. We do not, however, find any evidence of CS and UB having an effect on the likelihood of payment default. The point estimates of Exp(*B*) suggest that MC, SQ, and CI reduce the odds of customer default by 0.682, 0.864, and 0.785 respectively. Therefore, for example, after taking account of other variables in the model, a unit increase in monitoring and control measures (MC) implies more than 30% drop in the odds of a customer being in default. The point estimate of Exp(B) associated with TT (1.014), on the other hand, indicates that a reduction in transaction time does not bring about a marked improvement in the odds of customer default. Collectively, the predictors do have a significant effect on the prediction and essentially create a different model in our test of the full model against a constant only model. In other words, the predictors as a set reliably distinguish between defaulters and non-defaulters of water bill payment (χ^2= 82.721, p <0.001 with df = 7) Similarly, the oft-reported Nagelkerke R^2 indicates that 65.90% of the occurrence in the prediction is explained by the predictors.

Considering the presence of some weakly significant (TT and SV) and insignificant predictors (CS and UB) in the full model, we conducted stepwise logistic regression to achieve a parsimonious model of the most effective predictors

Table 4. Factors Associated with Customer Bill Payment Default (BPD)

Variables	*B*	*SE*	Wald	*Df*	Sig.	Exp(*B*)	95% CI for EXP(*B*)	
							Lower	Upper
TT	0.014	0.007	3.492	1	0.062	1.014	1.999	1.028
MC	-0.383	0.117	10.654	1	0.001	0.682	0.542	0.858
SQ	-0.146	0.046	10.341	1	0.001	0.864	0.790	0.944
CS	0.048	0.057	0.732	1	0.392	1.054	0.939	1.173
CI	-0.242	0.121	4.020	1	0.045	0.785	0.620	0.995
UB	0.160	0.099	2.571	1	0.109	1.173	0.965	1.426
SV	-0.178	0.098	3.301	1	0.069	0.837	0.691	1.014
Constant	7.783	2.346	11.009	1	0.001	2399.952		
-2 Log Likelihood..... 84.797						χ^2 .....82.721 (0.000)***		
Cox & Snell R^2 ..... 0.492								
Nagelkerke R^2 ..... 0.659								

Note: (i) ***means significant at the 1% level (2-tailed)
(ii) The figure in parenthesis is the *p* - value.

of customer default. In stepwise logistic regression, predictors are added to the regression equation one at a time, using the statistical criterion of reducing the -2 Log Likelihood error for the included predictors. The process of adding more predictors stops when all of the predictors have been included or when it is not possible to make a statistically significant reduction in -2 Log Likelihood using any of the predictors not included in the regression yet. The results are presented in the Table 5.

Table 5. Forward Stepwise Logistics Regression

Variables	*B*	*SE*	Wald	*Df*	Sig.	Exp(*B*)	95% CI for EXP(*B*)	
							Lower	Upper
MC	-0.342	0.104	10.892	1	0.001	0.710	0.580	0.870
SQ	-0.124	0.036	12.075	1	0.001	0.883	0.823	0.947
CI	-0.179	0.083	4.706	1	0.030	0.836	0.711	0.987
SV	-0.170	0.088	3.759	1	0.053	0.843	0.710	1.002
Constant	10.710	2.012	28.341	1	0.000	44794.130		
-2 Log Likelihood..... 91.679						χ^2 .....75.839 (0.000)***		
Cox & Snell R^2 ..... 0.463								
Nagelkerke R^2 ..... 0.620								

Note: (i) *** means significant at 1% level (2-tailed)
(ii) The figure in parenthesis is the *p* - value.

Not unexpectedly, in comparison to the full model, the parsimonious model obtained using stepwise regression drops TT, CS, and UB altogether. The remaining predictors in the full model, namely, MC, SQ, CI, and SV, appear significant in explaining the odds of a customer being classified as a bill defaulter. A comparison of the results presented in the Tables 4 and 5 does not indicate any dramatic change in the point estimates of Exp(*B*), nor does it suggest any change in the relative importance of other predictors of customer default. Finally, although we observe a marginal decrease in Nagelkerke R^2 (from 0.659 to 0.620), the parsimonious model is still statistically significant against a constant-only model, indicating that the predictors as a set reliably differentiate between defaulting and non-defaulting water customers in terms of their bill payment.

Discussion

The study examines the role of a set of institutional and behavioural factors in influencing the likelihood of bill payment default by the GWCL customers of the GARG. Consistent with the anecdotal knowledge and belief, monitoring and control measures by the water utility contributed significantly to the likelihood of customers defaulting in bill payment. The results show that increase in monitoring and control initiatives enhances the likelihood of collecting water bills on time. We consider this finding to be significant, especially when the monitoring and control activities of water utilities in most of the developing countries, including those of Africa, allegedly remain very poor.
Our results also suggest that an increase in service quality helps lessen the likelihood of customers defaulting in their bill payment. This finding is in line with several other findings, which argue that service quality improvement leads to a willingness to pay and ,therefore, leads to a reduction in the default rate (Ifabiyi, 2011 ; Kamaludin et al., 2013; Kanayo et al., 2013). Also, congruent with the results of simple correlation analysis, we find that an improvement in the customers' perception of service value and corporate image help improve the likelihood of timely collection of water bills. These results are consistent with the findings of Kayaga et al. (2004), who reported that service value and corporate image have a significant effect on customer loyalty, which eventually translates into improved bill payment behavior of Ugandan water utility customers.

Interestingly, although our correlation analysis suggests a significant negative effect of customer satisfaction on bill default, the result does not hold good in the regression analysis. Contrary to the common knowledge that satisfied utility customers will pay their bills on a timely basis, our regression results suggest customer satisfaction to be inconsequential in determining the payment default of Ghanaian water customers. This result may be due to the possibility that other judgmental constructs in our analysis (SQ, SV, and CI) may have already captured the effect of customer satisfaction in determining the default likelihood. Many studies in services management literature pose judgmental factors such as service quality and service value as causal antecedents to customer satisfaction (see, for example, Cronin et al., 2000 for a review). Finally, our results suggest that utility billing issues are not as important for the GWCL customers in determining their willingness to pay bills in a timely fashion.

Conclusion and the Way Forward

Like many other water utilities operating (especially) in the low-income countries, the Ghana Water Company Limited (GWCL) is also finding it increasingly difficult to keep its customers current with their water bills. Faced with poor cost-recovery through the revenue collection from the customers, it often has to rely on the government subsidy to maintain its service provision. In this backdrop, the goal of this study is to examine the role of a set of institutional and behavioural factors in influencing the likelihood of defaulting on bill payment by the water utility customers. Factors considered in the study include monitoring and control measures and utility billing issues, transaction time, service quality, service value, corporate image, and customer satisfaction. The results show that both institutional and behavioural factors play an important role in determining the likelihood of customer default. Specifically, we find that an improvement in institutional factors such as monitoring and control and behavioural factors such as service quality, service value, and corporate image has a significant effect in minimizing the likelihood of payment default. Notwithstanding the findings, our study, and its associated implications, the study has its own limitations. For example, the findings of the study may only apply to water utilities and not to other utilities such as electricity companies. Therefore, similar studies can be undertaken in the context of other utilities as well. Extending the analysis, further studies can be commissioned to examine the effectiveness of the factors identified in this paper in inducing bill payment default from a cross-country perspective.

Research Implications

The research findings have several implications for reducing payment default by the water utility clientele. Given the fact that the monitoring and control activities by the water utilities are generally very lax in most African countries, our study may serve as a wake-up call for the utility managers. This study clearly shows that, among the factors considered, sustained monitoring and control activities on the part of the utility have the most potential in lessening the

likelihood of non-payment by the water customers.

Our study also underscores the importance of customers' judgmental constructs such as service quality, service value, and corporate image in driving their willingness to pay water bills on time. It establishes that an improvement in customer judgment of service quality, service value, and corporate image significantly drives down the likelihood of customers defaulting in their bill payment. Therefore, not only taking institutional measures such as intensive monitoring and control, water utility managers should also work towards improving customer perception of service quality, value, and corporate image to encourage timely bill payment. Effective steps towards addressing common issues such as reducing water leakages and irregular water supply may help create a favourable impression in the minds of the customers about the utility and its services.

End Notes

[1] Quarterly Rate Adjustment Formula (QRAF) is an adjustment formula that reflects the difference between forecasted price and how much it actually costs water utilities to produce and supply water to the consumer. Rates adjustments are implemented on January 1, April 1, July 1, and October 1 after the Public Utilities Regulatory Commission reviews the utility's application.

[2] In fact, we are not aware of any study so far that uses logistic regression approach to modelling utility bill default.

[3] Cross-subsidy refers to a situation where some consumers are made to pay less at the expense of other consumers who are paying too much. It is sometimes deliberately used by water utilities to encourage customer bill payment.

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