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The Strategic Impact of Technology Based CRM on Call Centers' Performance

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Abstract

The primary objective of this paper is to test a model that can explain the impact of technology based CRM on inbound call center performance. To do this, data were collected from 168 call center managers and analyzed through structural equation modeling. The research findings indicate that technology based CRM significantly affects first call resolution and perceived service quality, but weakly influence caller satisfactions through the mediating role of first call resolutions. Observably, this research believes that customer contact centers as the first touch points to company are dependent on other factors such as company policy, product quality, customer characteristics, etc. to influence caller satisfactions, but unfortunately most of these factors fall outside the operational control of contact center activities. The findings in this research has empirically provided the long waiting evidence that technology based CRM applications within the inbound contact center industry can only influence caller satisfactions through first call resolution and perceived service quality. A major implication for call center managers is that this research findings has availed them the opportunity on how to effectively develop, implement, and evaluate their CRM applications.

Keywords: **Contact centers; call centers; technology based CRM; first call resolution; perceived service quality; inbound; caller satisfaction.**

1. Introduction

In the business world today, businessmen have recognized that customers are the core to any successful business. This is because both academic and industry researchers have proven that every business's success depends greatly on the effectiveness of such companies in managing its relationships positively with the current and potential customers (SQM, 2007; Brady, 2001; Berry, 1995 &1983). Due to this unavoidable phenomenon, most organizations have been making it a must to integrate their team of managements and employees into knowing and practicing customer orientated approach (Dean, 2009; 2007; 2004; McNally, 2007; Sin et al., 2005; Roland and Werner, 2005; Kohli et al, 1993; Narver & Slater, 1990).

Efforts in understanding how managers could effectively establish and maintain long term positive relationships with their customers have led this current study into understanding the term "Relationship paradigm". As referred, relationship paradigm have been argued as all activities that are directed towards the establishment, development and maintaining successful relational exchanges between an organization, its customer and suppliers (Aihie & Bennani, 2007; Gummesson, 2004; Berry, 1995). This concept of relationship interfaces is centered on where and how individuals and organizations exchange information whether internally as well as externally (Berry, 1983). It empirically means an organization's ability in getting in touch with both the internal and external

customers in responsive and flexible manners. But in practice, it has been argued that there is a wide gap between what organizations does, and what are most desirable for them to do (McNally, 2007; Gummesson, 2004; Ford, 1980). Following the trends of how best to acquire, satisfy and retain both the current and potential customers emancipated into the emergence of customer relationship management (CRM), a concept that is said to derive its popularity since 1990s (McNally, 2007; Sin et al., 2005; Yim et al., 2005). CRM is said to offer a long term changes and benefits to businesses that choose to adopt it, because it enables companies to successfully interact with their customers in a dynamic and profitable manner (Aihie and Bennani, 2007; Adam and Michael, 2005; Gummesson, 2004; Sin et al, 2005).

It is arguable that both academic literatures and industry reports have established the importance of customer relationship management in marketing activities, specifically in the customer contact centers where it has helped in digitalizing staff's knowledge about customers' critical information through computer telephony integration, fax, email, web chatting etc (Dean, 2009; 2007; Sin et al., 2005; Yim et al., 2005; Roland and Werner, 2005). While this current study cannot disconfirm the available arguments in favor of CRM applications, there are reliable data that shows a range of major issues that is affecting call centers such as poor technology, shortage of skilled employees, high abandonment rate, high average speed of answer, low first call resolution, low quality assurance program, employee job dissatisfaction, high attrition rate, high cost of operations, and customer dissatisfaction (Callcentre.net, 2008; 2003).

Disappointedly, despite the enormous increasing acknowledgement of CRM importance, very little studies have focused on the relationship that exist between technology based CRM applications and caller satisfaction within the inbound customer contact center industry (Soon, 2007; Bang, 2006; Sin et al., 2005; Yim et al., 2005). In support of the emphasis above are ample of evidences provided by several sources on the severe customer dissatisfactions with contact centre services across the globe (Callcentre.net, 2008; 2003; SQM, 2007; Feinberg et al., 2002; 2000; Miciak and Desmarais, 2001), and that the major problems are stemming from factors such as lack of established technology based CRM (Yueh et al., 2010; McNally, 2007; Wang et al., 2006; Bang, 2006; Sin et al., 2005; Yim et al., 2005), first call resolution (SQM, 2007; Callcentre.net, 2003; Feinberg et al., 2002; 2000), perceived service quality (Dean, 2009; 2007; 2004), and employee performance (McNally, 2007; Lee et al., 2006; Roland & Werner, 2005).

2. Conceptual background and hypothesis

2.1 Technology Based CRM

Although it has been established that consumers do complained about the time and efforts they required to have their individual questions answered or their problems resolved whenever they interact with contact centers (SQM, 2007; Call Centre.net, 2003). Equally important are arguments in favor of careful implementations of Screen Pops as an effective means of improving customer service representative performance, first call resolution and caller satisfactions while simultaneously reducing the contact center processing costs (SQM, 2007; Yim et al., 2005; Call Centre.net, 2003). Not only within the contact centers, CRM technologies are wide systems which could be integrated into various other systems like enterprise research planning systems etc, and both academic researchers and practitioners agreed to the benefit inherent in CRM integration (Nguyen et al, 2007; Dean, 2007; Eid, 2007; Yim et al., 2005). Evidence from

existing contact center literatures shows that several authors have argued in favor of FCR technology enablers through intelligent skill based routing as a good means of achieving FCR, perceived service quality and caller satisfaction (SQM, 2007; Callcentre.net, 2003). This is because through the application of CRM technologies such as first call resolution enablers, contact centers can match their customers and/or their call types with the appropriate customer service representatives knowledge and skills.

If efficiently managed, CRM system is argued as having the capacity to assist organizations in handling customer queries and complaints more professionally with both accurate and timely information that would assist in reducing employee role stress, attrition rate and subsequently increasing employee job performance, perceived service quality, first call resolution and customer satisfaction (SQM, 2007; 2005). Also very important in this area of research is the benefits inherent in the integration of every unit of the customer contact centers, i.e. inbound, outbound and web enabled via CRM technology that provides a great opportunity for seamless and transparent services in customer touch points. In relation to the above, the extent of a company's CRM integration will strengthen its ability to resolving customer's request in the first call, its perceived service quality and also give opportunity for achieving both customer and employee satisfactions (Dean, 2007; SQM, 2007; Sin et al., 2005; Yim et al., 2005).
The above has led this research into the following four Hypotheses:
H1: Technology based CRM of the customer contact center is positively related to First Call Resolution.
H2: Technology based CRM of the customer contact center is positively related to Perceived Service Quality.
H3: Technology based CRM of the customer contact center is positively related to Caller Satisfaction.

2.2 First Call Resolution

First call resolution (FCR) has been defined as the percentage of callers that does not requires any further contacts to the company (Feinberg et al., 2002). This study will like to define FCR as the percentage of customers that do not need to callback in order to address their initial primary reason of calling the organization. Different authors such as Feinberg et al (2000), Roland and Werner (2005), Robinson and Morley (2006), Eric et al (2006), have argued in favor of FCR as the major determinant of caller satisfaction. Similarly, Stephen and Michael (2008) in their review of call centers measurement have equally confirmed the significance of FCR by arguing that caller satisfaction will drop at an average of 15% in every callback a customer made to the call center. And that top industry firms are defined in terms of those that their caller satisfaction ratings are at an average of 86% (Stephen and Michael 2008).

Given the aforementioned empirical evidences in support of FCR as a major determinant of caller satisfaction (Stephen and Michael, 2008; Feinberg et al 2002; 2000) and that FCR is an outcome of the present or previous service encounters (SQM, 2007; 2005; Feinberg et al 2002; 2000). This research propose that the contact center customers can only evaluate (issues resolved or not and satisfied/ dissatisfied) with contact center service delivery only after they could interpret (perceive) the services. The above argument was the strong academic evidence upon which Dean (2007; 2004) tested the mediating impact of perceived service quality. Therefore this current study argued that first call resolution is an outcome of technology based CRM applications that positively mediate its relationship with caller satisfaction of the inbound call centers.

Conclusively, based on the aforementioned facts and arguments in supports of the relationships between FCR, technology based CRM and caller satisfactions, this research proposed the following direct and indirect hypotheses:

H4a: First call resolution of the customer contact center is positively related to Caller Satisfaction.

H4b: First call resolution of the customer contact center positively mediate the relationship between technology based CRM and Caller Satisfaction.

2.3 Perceived Service Quality

As argued by Zeithaml et al (1985), organizations' ability to delivering a superior service quality has been established as a prerequisite for a success and survival in the current business world. And this success is said to be more dependent on customer satisfaction through a set of the quality of service delivered (Cronin and Taylor, 1994).

A related generally acceptable standard that service quality is a perception of judgments about the superiority of a service rendered by an organization, but till now the exact nature of this attitude or perception has not been globally agreed (Mohr, 1998). Many authors have suggested that perceived service quality originates from a comparison of different individual expectations with different company's performance perceptions or disconfirmation of expectations (Parasuraman et al., 1988). Others such as Teas (1993a) argued that service quality is said to be derived from a comparison of service performance with expected industry ideal standards, while Cronin and Taylor, (1992) argued that it is from perceptions of organization's performance alone. To further analyze the opinion and findings of researchers on the difference between perceptions and actual performance, many authors have proposed different instruments for measuring customer satisfaction in service industry.

In the contact center industry, perceived service quality has been defined as the customers' overall assessments of the superiority of a firms' service with respect to its service interactions and the subsequent outcomes (Cronin and Taylor, 1994; 1992). In their synthesis of previous literature reviews, Brady et al (2001) have established three service quality dimensions: interaction, environmental, outcome quality. Due to the telephony context under which this present study is being conducted, Dean (2007) argued on the need to exclude the physical environment and integrate interaction quality as the customer service representative behavior, and the outcome dimension as the waiting time (Dean, 2007). But notably the measurement instruments that were adopted by Dean (2007) clearly indicates that they are operational variables such hold time, average handling time, etc that were initially found by Feinberg et al (2002) as not significantly related to caller satisfactions. Given the trends in these theoretical linkages, this study therefore considers to adopt Dean (2007; 2004) because they are most recent and also the only observed academic literatures that have empirically developed measurement items for perceived service quality as positively related to caller satisfaction within the inbound contact center industry. Based on these evidences, this study proposed the following direct and indirect hypotheses:

H5a: Perceived service quality of the customer contact center is positively related to caller satisfaction.

H5b: Perceived service quality of the customer contact center positively mediate the

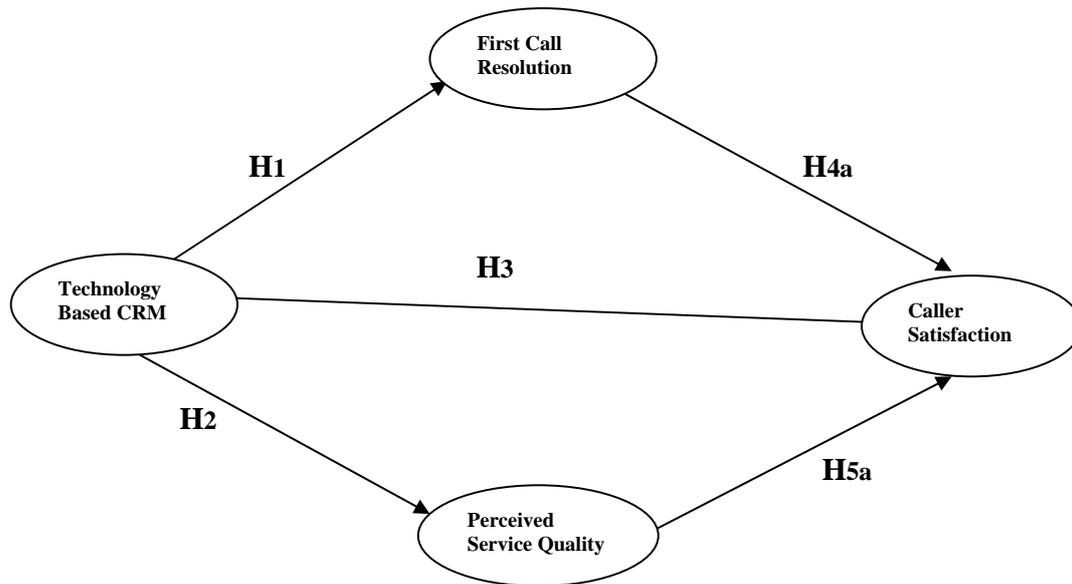relationship between technology based CRM and Caller Satisfaction.

Fig. 1: Theoretical framework for this study

3. Methodology

3.1 Sample and data collection procedure

For ease of generalizability of the research findings, this study has randomly distributed 400 questionnaires via mail and web survey based on a detailed list of 600 call centers that were alphabetically listed in the CRM and contact association of Malaysia manual. This type of data collection method is consistent with existing industry literatures such as Yim et al (2005) and Feinberg et al (2002; 2000). From the 400 questionnaire, only 173 were returned and 5 discarded due to large numbers of missing values. Thus, finally putting the total usable data for further analysis at 168 and constituting an overall 43.3% response rate for this study. The obtained sample size in this study appears to be very adequate and the response rate is also comparable to many contact center studies that have used managers and senior executives as the study sample. In those studies their respective response rates were between 15 and 49 percent (Chen et al., 2010; Dean, 2009; Richard, 2007; Roland and Werner, 2005; Sin et al., 2005; Yim et al., 2005). Out of the 173 respondents, 103 answered through the mail questionnaire, while the

remaining 70 responded through the Web. To avoid multiple responses from same company, the researcher did compare the respondents from the online and mail on key variables like their annual revenue, experience, number of employees etc. And the results show that those who respond to mail questionnaire are different to those that responded to the online questionnaire.

3.2 Measurements and Data Analysis

The usual seven point rating scales that are normally used in social sciences research were used in this study for measuring the latent constructs (Churchill and Peter 1984). More importantly are the business performance variables like caller satisfaction and first call resolution that were measured by asking the respective call center managers what percentage of their 2009 callers surveyed that reported top box "first call resolution" and "satisfactions" on a seven point scale ranging from 1 = below 40% to 7 = above 90%. The term "top box" is an industry words that call centers normally used in determining the highest level of their customers that achieved satisfactions and issues resolved on the first call. This approach is consistent with other studies in inbound call centers, where researchers have asked managers to rate their callers' satisfactions and FCR as obtained through interactive voice response or telephone/email surveys.

Very important to note is that at the initial interview with call center managers, this study developed a set of ratio scales meant to measure the performance of the contact centers both on their caller's ability to achieve satisfactions and resolutions on first call. But these proposed ratio scales ware turned down by the managers at the face validity as been a subject of privacy. This group of call center experts alternatively suggests that it is better to use the industry standard which will ask the company to rate their performance based on their previous callers' survey. Meanwhile, these suggestions by the managers' are theoretically in line with existing studies within the inbound call centers like Roland and Werner (2005), Yim et al (2005) and Feinberg et al (2002; 2000) that have all asked companies to rate their performance based on the percentage of their callers surveyed that reported top box satisfactions and first call resolution. Two of these studies, specifically Roland and Werner (2005), and Yim et al (2005) also used structural equation modeling as statistical analysis techniques. For verifications of the measurement items for each constructs in the model, below is table 1:

Table 1: Conceptual Measurement Items and Constructs

Constructs	Items	Code
Technology Based CRM	My organization has the right technical personnel to provide technical support for the utilization of computer technology in building customer relationships.	**TCRM1**
	My organization has the right hardware to serve our customers.	**TCRM3**
	Individual customer information is available at every point of contact.	**TCRM4**
	Our computer technology can help create customized offerings to our customers	**TCRM6**
	IT facilitates the management of customer relationships	**TCRM8**
Perceived Service Quality	My organization customer service consultant are taking enough time to attend to customers and not rushing the customers	**PSQ4**
	My organization customer service consultant are being able to solve different problems	**PSQ4**
	My organization customer service consultant are explaining steps in the	**PSQ5**

	process to customers (or reasons for problems)	
	My organization customer service consultant are treating the customers with empathy	**PSQ6**
	My organization customer service consultant are having the authority to solve customers' problem	**PSQ7**
First Call Resolution	Based on your 2009 customer surveyed, how would you rate your organization in terms of callers that have satisfactory resolution on the first call	**FCR**
Caller Satisfaction	Based on your 2009 customer surveyed, how would you rate your organization in terms of callers that reported "top box" customer satisfaction rating	**CS**

4.0 Empirical Results

For this empirical study, the researchers have made used of multi-attribute approach in measuring technology based CRM and perceived service quality as adopted from Dean (2007), Sin et al (2005) and Yim et al (2005). Importantly, these two constructs were both measured using 5 items scale each. Below is table 2 that shows that 68.54% of the variance in technology based CRM is explained by the scale and all the items are greater than the prescribe 0.5. Reliability for both the technology based CRM and perceived service quality were obtained by using the calculation of cronbach α and composite reliability. For technology based CRM, its cronbach α and composite reliability were 0.885 and 0.967 respectively. Meanwhile, the EFA results also indicated that 61.63% of the total variance in perceived service quality is explained by the five items scale while its entire factor loading are equally greater than the recommended 0.5 cut off criterion. The cronbach α for perceived service quality is 0.844, while its composite reliability is 0.963. The result empirically shows that the cronbach α and composite reliability for these two variables are above the recommended 0.7 cut off criterion as suggested by Byrne (2010) and Hair et al (2006).

Sequel to the processes above, this study conducted confirmatory factor analysis (CFA) on both technology based CRM and perceived service quality through AMOS 16 as suggested by Bryne, 2010. The primary aim of conducting this EFA was to test convergent validity on both constructs as revealed in table 3 below. The suggested fit indices by several authors were made used in assessing the adequacy of the research model (Byrne, 2010; Eid, 2007; Hair et al., 2006). As argued that the convergent validity of any CFA analysis ought to be supported by the reliability of the constructs' items, and the average variance that is determined from the variance extracted (Byrne, 2010; Eid, 2007; Hair et al.,2006). Below is table 2 that summarized the results of the exploratory factor analysis for both technology based CRM and perceived service quality:

Table 2: Validity Results – Convergent

Variable	Code	Factor Loading	Variance Explained (%)	Cummulative Variance Explained (%)	Cronbach α	Composite Reliability
Technology Based CRM (TCRM)	TCRM1	0.812	68.541	68.541	0.885	0.967
	TCRM2	0.795				
	TCRM3	0.795				

	TCRM4	0.787			
	TCRM5	0.774			
Perceived Service Quality (PSQ)	PSQ1	0.782	**61.628**	**61.628**	**0.844**	**0.963**
	PSQ2	0.781				
	PSQ3	0.778				
	PSQ4	0.722				
	PSQ5	0.688				

Table 3: Variance Extracted

Variable	Code	Square Multiple Correlation (SMC)	SMC^2	Standardized Error (SE)	Variance Extracted (VE)
Technology Based CRM	TCRM1	0.526	0.276676	0.004	
	TCRM3	0.64	0.4096	0.004	
	TCRM4	0.623	0.388129	0.004	
	TCRM6	0.625	0.390625	0.003	
	TCRM8	0.616	0.379456	0.004	
			1.844486	**0.019**	**0.990**
Perceived Service Quality	PSQ2	0.393	0.154449	0.005	
	PSQ4	0.674	0.454276	0.004	
	PSQ5	0.619	0.383161	0.004	
	PSQ6	0.491	0.241081	0.005	
	PSQ7	0.444	0.197136	0.005	
			1.430103	**0.023**	**0.984**
First Call Resolution	FCR	0.131	0.017161	0.008	**0.682**
Caller Satisfaction	CS	0.06	0.0036	0.011	**0.247**

As indicated in table 3 above, the values of the variance extracted estimates measures the amount of variances that each constructs captured ranges from 0.247 to 0.990 as calculated through the squared multiple correlation (SMC) and the standard error of variance (SE). The above results shows that the variance extracted for three out of the 4 constructs were greater than 0.5 as suggested by Hair et al (1998), with the exception of caller satisfaction that its variance extracted is estimated to be 0.247. Detailed explanations on the implications of this low variance of caller satisfaction are provided in the coming sections of this study. The values for SMC and SE were all extracted from the AMOS 16 outputs. Below is table 4 that summarizes the average variance extracted (AVE) which is the variance of the indicators that is explained by each constructs in the model.

Table 4: Discriminant Validity - AVE

Name of Variables	TBC	FCR	PSQ	CS
Technology Based CRM (1)	1.000			
First Call Resolution (2)	0.987	1.000		
Perceived Service Quality (3)	0.836	0.833	1.000	
Caller Satisfaction (4)	0.619	0.616	0.465	1.000

"Technology Based CRM (TBC), First Call Resolution (FCR), Perceived Service Quality (PSQ), Caller Satisfaction (CS)"

Bryne (2010) suggested that any AVE which is above 0.50 indicates convergent validity and a good sign that the validity of each construct in the model is high. For this study as indicated in table 4, the ratio for three out of the four latent variables were above the suggested 0.50 cut off criterion, with exception of the ratio between perceived service quality and caller satisfaction that was 0.465. For the other three constructs, this result statistically confirmed that the validity of technology based CRM, first call resolution and perceived service quality falls within the suggested standard.

Following the above analyses, this study went further to test the proposed theoretical framework as shown in Fig. 2 by using structural equation modeling (SEM). SEM analysis assisted in examining the relationships that exist between these four hypothesized constructs relationships. Below is figure 2 which aptly depicts the research findings as obtained through SEM analyses of the structural model:
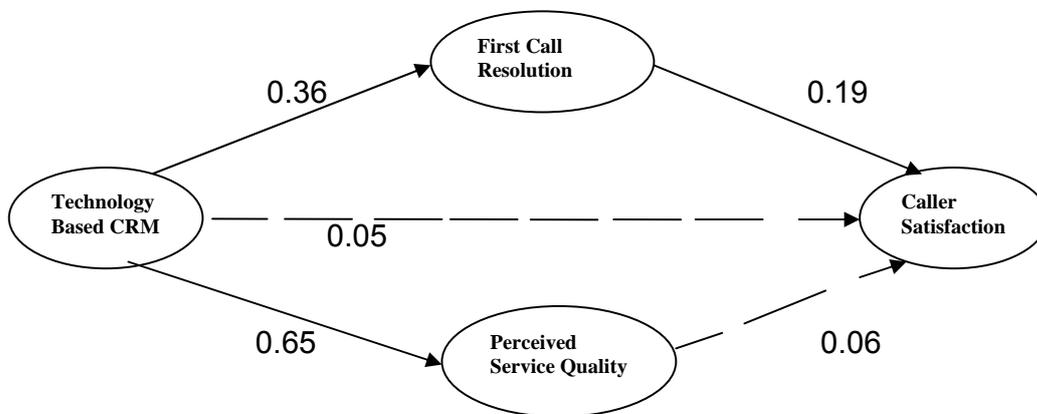

Fig. 2: Findings from the structural Model

As indicated in table 6, the overall results from the SEM analysis shows that the chi-square (x^2) statistic is very small at 63.306 with 51 degrees of freedom and an insignificant p-value of 0.116. This result is very good because it is greater than the suggested p-value of 0.05, a valid indication that the model is statistically accepted (Byrne, 2010). Inability to achieve a p-value that is greater than 0.05 and a chi-square that its ratio to degree of freedom is less than 5 will technically lead to the rejection of the model as stipulated in the goodness of fit indices of any SEM analysis (Bryne, 2010; Eid, 2007; Hair et al., 1998). Notably, the ratio of chi-square to the degree of freedom in this study is 1.241, a value that is far small to the suggested less than 5 that is prescribe to

achieve goodness of fit indices (Hair et al., 2006). The results in table 7 have statistically shown that the model in this study is acceptable.

Also very important are the other indicators to achieve goodness of fit in any model: such as GFI: 0.934, CFI: 0.984, TLI: 0.979, NFI: 0.922, RMSEA: 0.040 to mention few. A critical comparison of these results with the above corresponding values in Tables 2, 3, and 4 has suggested that the above hypothesized model in figure 1 empirically fits the data.

Table 5: Indirect Effects and Interpretations of Mediating Hypotheses

Hyp	Exogenous		Mediated		Endogenous	Direct Effects Estimates	Indirect Effects Estimates	Mediating Hypothesis
H3,4b&5b	TBC	→	FCR&PSQ	→	Caller Satisfaction	0.054	0.108	Mediating

"Technology Based CRM (TBC), First Call Resolution (FCR), Perceived Service Quality (PSQ)"

As observed in figure 2, all the five hypothesized positively relationships support the conceptual model, except for technology based CRM (H3) and perceived service quality (H5) that are not statistically significant to caller satisfaction at 5% confidence level. But this insignificant relationship in H3 was particularly offset by the mediating impact of first call resolution (H4) on caller satisfaction. Table 6 shows that the standardized indirect estimate (0.108) in H4 is positive and greater than the standard direct estimates in H3 (0.054). A critical look at table 7 shows that first call resolution has a major impact on caller satisfactions, therefore we can conclude that FCR positively mediate the relationship between technology based CRM and caller satisfaction. Similarly, the result also shows that technology based CRM is positive and significantly affect both first call resolution and perceived service quality, namely TBCRM to FCR (H1) with (standardized estimate 0.36, P, 0.000), TBCRM to PSQ (H2) (standardized estimate 0.65, P , 0.000) but statistically significant at 5%. Importantly, the above three significant relationships have provided the required empirical supports for those theoretical views which have stated that technology applications is an important input to the management of any relationship marketing strategies (Eid, 2007; Mcnally, 2007; Sin et al., 2005; Yim et al., 2005; Gummesson, 2004). Meanwhile, perceived service quality as noted within the inbound call centers are good facilitator for customer service agents in personalizing and customizing their customer service activities to the current and potential customers, but not efficient in actualizing caller satisfactions (Chen et al., 2010; David and Wendy, 2009; Kyootai and Kailas, 2007; Nguyen et al, 2007; Feinberg et al., 2002). The above results further establish that the efficiency of call centers in making use of their technology applications will go a long way in assisting them to achieve high percentage of callers that their issues will be resolved in the first call and subsequently improving caller satisfactions.

Table 6: Goodness of Fit Index for the Model

Final Models	Criteria	Results
CMIN/Df	< 5	1.241 (63.306/51)
P-value	> 0.05	0.116
GFI	> 0.9	0.934
CFI	> 0.95	0.984
TLI	> 0.9	0.979
NFI	> 0.9	0.922
RMSEA	< 0.05	0.040

Table 7: Direct Effects of Revised Model

	Endogenous	Exogenous	Estimate	S.E.	C.R.	P	Label	R²
H1	FCR	<--- TBC	.539	.128	4.225	***	**Sig**	
H2	PSQ	<--- TBC	.561	.100	5.618	***	**Sig**	
H3	CS	<--- TBC	.091	.207	.437	.662	**Not Sig**	
H4a	CS	<--- FCR	.217	.097	2.223	.026**	**Sig**	
H5a	CS	<--- PSQ	.118	.239	.494	.621	**Not Sig**	
FCR								0.13
PSQ								0.42
CS								0.06

P < 0.10; **P < 0.05; *** P < 0.01, **Sig = Significant; **Not Sig** = Not Significant*

"Technology Based CRM (TBCRM), First Call Resolution (FCR), Perceived Service Quality (PSQ), Caller Satisfaction (CS)"

A critical evaluation of the above results as indicated in tables 6 and 7 shows that all the variables in the model supports the hypothesized positive relationships between technology based CRM, first call resolution, perceived service quality and caller satisfaction. Also, the measurement items in the structural models confirms the reliability and validity of the tested data through their achievement of the suggested non-significant p>0.05. The structural model fit indices such as GFI, CFI, TLI and RMSEA etc were all above the suggested cut off criterions (Hair et al., 2006). This results as obtained from the total effects of the structural model analysis typically demonstrate that the implementations of technology based CRM in call centers does positively and significantly influence first call resolution and perceived service quality, but moderately influence caller satisfaction. A major practical implication for the higher R^2 in perceived service quality does indicate that 42% of the total variations in call center service quality performance are explained by CRM technology implementations. In aggregate, the research findings has shown that the combined effect of technology based CRM, first call resolution and perceived service quality merely account for 6% of the total variability of inbound caller satisfaction. The result equally shows that FCR is the only construct that is statistically significant to caller satisfaction at (H4) with a (standardized estimate 0.19, P, 0.26). A good thing to note is that this result has re-confirmed the findings in Feinberg et al (2000) which empirically established that there exists weak relationship between call center applications and caller satisfaction with R² of 5%. Observably, this research believes that the customer contact centers as the first touch points to company are dependent on other factors such as company policy, product quality, customer

characteristics, etc. to influence caller satisfactions, but unfortunately most of these factors falls outside the operational control of contact center activities (Teehan & Tucker, 2010; Shire et al., 2009).

Table 8: Goodness of Fit Index for the Model

Hypothesis	Relationship	Testing Results
H1	Technology Based CRM → First Call Resolution	Supported
H2	Technology Based CRM → Perceived Service Quality	Supported
H3	Technology Based CRM → Caller Satisfaction	Not Supported
H4a	First Call Resolution → Caller Satisfaction	Supported
H5a	Perceived Service Quality → Caller Satisfaction	Not Supported

5.0 Conclusion, limitations and directions for future research

This research has empirically brought together numbers of distinct domains such as relationship marketing, information technology, and customer relationship management. Technology based CRM was empirically tested and found to be the antecedents of first call resolution and perceived service quality. While caller satisfactions are the consequence of first call resolutions. This study has developed one item observed variable based on call center survey in 2009 for measuring first call resolutions and caller satisfactions.

As expected, technology based CRM is positive and significantly related to perceived service quality, an indication that the operational efficiency of call center is strongly dependent on CRM technology applications. Technology based CRM is also positive and significantly related to caller satisfactions, a result which shows that technology applications such as online self service, 24 hours hotline, email services, fax and chatting have positive influence on customer satisfactions. More dynamic and interesting among the research findings is the mediating role of first call resolutions on the relationship between technology based CRM and caller satisfactions. The result shows that no matter the extent to which call centers organize its strategic business units around CRM technology applications, it must first achieve first call resolution before expecting any positive impact caller satisfactions.

This empirical study has provided the long waiting evidence that CRM applications within the contact center industry will significantly impact call center performances. The empirical findings in this research has clearly provided an effective means through which call center managers can develop, implement, utilize and evaluate CRM applications in their companies. This research practically suggest that managers have to provide enough time and training to their customer service representative to understand the impact of using CRM applications in adding value to their operational performances and meeting customers requirements at profit. For those call centers that are currently considering implementing sophisticated CRM technology, it would be efficient and prudent if they could first determine their customer characteristics and human resource capability. Observably, this research believes that the involvement of information technology experts in call center CRM implementations is beneficial, but it would be far better if call center managers can provide customer oriented training to these IT officers before deciding on what best CRM technology to be implemented.

There are some limitations in this study as it applies to any other studies. The first limitation is that this study has empirically assessed call centers/Contact center success through caller satisfaction (an observed variable through their 2009 customer survey).

Notably contact center successes are a broader construct which includes caller loyalty, cost minimizations (profits, labor turnovers), employee satisfaction etc (Dean, 2007; Roland and Werner, 2005). Consequently this study cannot generalize its findings in all the constructs of contact center successes and across countries.

Although the research findings show that perceived service quality is positive but not significantly related to caller satisfactions and also not having strong mediating effect on the relationships between technology based CRM and caller satisfactions. Still the researchers believes there is need for further study to investigate this finding given the mixed opinion of researchers on the impacts of perceived service quality within the inbound call center industry (Dean, 2007; Roland and Werner, 2005; Feinberg et al., 2002). Also very important is that there is need for a research on additional variable such as caller's inputs (education, culture, age and buying behavior) that may directly or indirectly influence customer's first call resolutions and satisfactions.

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