Original Article

# The mediating effects of first call resolution on call centers' performance

Received (in revised form): 5th October 2010

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**ABSTRACT** **This article aims to examine and validate the prepositions of the mediating impacts of first call resolution (FCR) on caller satisfaction within the contact center industry. A survey of 168 call center managers was analyzed through structural equation modeling, constituting an overall 43.3 per cent response rate for this study. The results show that FCR positively mediates the relationship between knowledge management, technology-based CRM and caller satisfaction within the inbound customer contact centers. We have empirically assessed call centers/contact centers' success through caller satisfaction (an observed variable through their 2009 customer survey in Malaysia). Consequently, this study cannot generalize its findings in all other countries. Our strong argument is that within the operational variables, FCR is statistically significant and positively mediates knowledge management applications. But very important to note is that the customer contact centers are first touchpoints to a company's goods or services, and that many other factors such as product quality, company policy, target markets, decision-making processes and so on are also determinants of caller satisfaction, but fall outside the operational control of contact center activities. This research has empirically established that a company's capability in effectively acquiring a valid understanding of its current and potential customers' information through CRM technologies will positively impact its acquisitions, customization, management and retention of customers. It also avails both the academic and contact center management the benefits that are inherent in measuring**

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**the impact of knowledge management and technology-based CRM on inbound FCR and caller satisfaction. This study finally recommends alternative areas for future research.**

*Journal of Database Marketing & Customer Strategy Management* (2011) **18,** 16–30. doi:10.1057/dbm.2011.4

**Keywords:** call centers; knowledge management; technology-based CRM; first call resolution; caller satisfaction

## INTRODUCTION

Contact center is the transformation of traditional call centers into modern multimedia-based interaction centers that have integrated different types of communication channels such as the telephone, Internet web, online chatting, email, fax and so on, in interfacing with the organization's current and potential customers at profit.[1–3] Among the motivating factors in the emergence of contact centers across the globe are the complex market competitions that have led many organizations into focusing on how best to maximize customer's interaction in order to improve service quality, customer satisfaction and cost of operation.[4,5] It is apparently clear with substantial evidence that the contact centers are now the preferred and most prevalent means through which many companies now acquire, retain and maintain long-term relationship with both their current and potential customers.[6,7] Good examples are the Fortune 500 companies that are estimated to be operating on average 30 different call centers each.[8]

Thus, the call center industry is said to be vast and continually expanding in terms of both workforce and its economic scope. For example, industry report has estimated that not $<70$ per cent of all the customer business interactions now occur via call centers and that at least US$700 billion worth of goods and services were sold via call centers and contact centers in 1997.[8] It is important to note that recognized industry reports have established that these figures have since been expanding at 20 per cent annually.[8,9] It was equally established that over 3 per cent of US working population are currently employed in call centers/contact centers.

Despite sufficient studies in support of the enormous opportunities that CRM technologies avail companies through maximization of customer's information in making quick and intelligent business decisions that help in resolving issues and provide efficient service to the respective customers.[10–12] However, on the contrary, there is reliable evidence from previous marketing researches and industry reports that in reality contact centers are failing to realize their targeted actual potentials in helping organizations to achieve the goals of providing the desired levels of caller satisfaction.[9,13,14]

Notably, a major theoretical gap in the extant literature lies in the insufficient research to explore the impact of knowledge management, technology-based CRM and first call resolution (FCR) on caller satisfaction within the inbound units of the contact center models.[15–17] In view of the above, it becomes paradoxical that despite the available overwhelming arguments in favor of knowledge management and technology-based CRM as a strategic tool for acquiring and retaining potential customers, and reducing operational cost, the set goals are yet to be achieved.[10,16,17] Therefore, of serious concern to both the managers and academics is the lack of adequate knowledge of the determinants of caller satisfaction within the inbound units of contact center industry.[6,18–20]

## CONCEPTUAL BACKGROUND AND HYPOTHESIS

### Knowledge management

The development of knowledge management applications in contact center industry constitutes one of the six streams of research from which relationship marketing has emerged.[17,21] Knowledge management basically examines the strategic impact that information strategies could have on the relationships within and outside an organization.[22] The other five streams of relationship marketing research includes: Service relationships, inter-organizational exchange relationships, channel relationships, network relationships and value chain relationships. Importantly, knowledge management is an efficient means of assisting companies' ability to learn from each customer interaction.[4,6,23]

Within the customer contact centers, knowledge management has been consistently argued as a good means of gathering customer information, specifically information on personal and transactional data such as complaints, enquiries, claims feedbacks and so on.[24]

On the whole, knowledge management in contact center industry is said to require a culture where every customer contact is perceived as a learning skill and each customer interaction as a chance to knowledge building and an opportunity to collect latest information about the customer.[4,25] The aforementioned arguments led both[16,17] to conceptualize and empirically establish that there exist positive relationships between a company's knowledge acquisition, its usage and customer satisfaction.

Finally, within the contact center industry, it is evident that they are now more concerned with better means of responding to their customer demand. This is mainly because actions that are taken in a prompt manner would not only enhance the contact center service quality, but would equally foster positive long-term relationships with their customers.[6,16,17,21] In view of the above evidence, this research proposes that:

**Hypothesis 1:** There is a positive relationship between knowledge management and FCR.

**Hypothesis 2:** There is a positive relationship between knowledge management and caller satisfaction.

### Technology-based CRM

Technology-based CRM as an efficient means of collecting, storing, analyzing and sharing both current and potential customers' information has been argued as a unique opportunity to many organizations in their ability to attract and retain customers.[16,21,26,27]

Similarly, most of the findings in the existing literature and industry reports aptly depict that the major cost of running a call centre is the labor cost.[7] Echoing on the improvements of customer satisfaction and operational cost, many organizations have since the mid-1990s started to look for the development of more sophisticated communication and information technology equipment. It is believed that this could handle a large sum of customer interactions using common equipment and databases, thereby enhancing the opportunity to reduce the labor content in the interactions.[28]

Other studies have also argued that a company's ability to link the CRM system to different strategic business units such as marketing, finance, distribution, operations and human resources will provide additional value to both internal and external users, and more importantly to the achievement of both employee and customer satisfaction.[5,17,29,30] If efficiently managed, the 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 FCR and customer satisfaction.[8,19]

Many of the existing studies have argued in support of the positive impact that the initiation, development and implementations of CRM technology within an organization has on the long-term customer relationships.[4,31,32] Notably, this study identified that it is widely possible for researchers to determine whether or not an organization has in place CRM technology; however, measuring the effectiveness of its utilization in terms of user acceptance and the desired operational performance have since been neglected and this has been confirmed as very vital to the implementing firm.[31] On the basis of these facts, this research proposes that:

**Hypothesis 3:** There is a positive relationship between technology-based CRM and FCR.

**Hypothesis 4:** There is a positive relationship between technology-based CRM and caller satisfaction.

### First call resolution

FCR is the percentage of callers that does not require any further contacts or callbacks to address their previous reason of calling.[19, 20] Also in support of FCR arguments is the fact that it ought to be defined from the customer perspective, which any attempt by firms to calculate will amount to an incorrect estimate.[20]

Despite the enormous increasing acknowledgement and arguments in favor of FCR as the best determinant of caller satisfaction and key performance indicator within the contact center operations,[8,20,33] surprisingly very little academic studies have focused on its mediating impacts on caller satisfaction within the customer contact center industry. In support of the above emphasis is ample evidence provided by several sources on the severe customer dissatisfaction with contact centre services across the globe.[9,19,20,33] It is emphasized that the major problem stems from lack of established knowledge management, technology-based CRM[4,16,17,21] and FCR.[19,20] Nonetheless, within the list of few studies that have been conducted on caller satisfaction, there is one specific operational variable called 'FCR' that has been established to influence caller satisfaction.[13,14,20] However, Feinberg *et al*[13,20] empirically argued that FCR is a customer perception of the outcome of a service encounter as implemented within the CRM strategy of any firm. As such, this current study intends to establish the mediating impact of FCR on caller satisfaction.

**Hypothesis 5:** There is a positive relationship between first call resolution and caller satisfaction.

## METHODOLOGY

### Sample and data collection procedure

For generalization of the research findings, 400 questionnaires were randomly distributed from a list of 600 call centers as listed in an alphabetical order by the CRM and contact center of Malaysia via mail and web survey. This type of data collection method is consistent with existing industry literature such as Feinberg and colleagues and Yim *et al.*[13,17,20] From this number, only 173 questionnaires were returned, out of which five were discarded because they were incomplete. Thus, this puts the total usable responses for further analysis at 168, which constitutes an overall of 43.3 per cent response rate for this study.

The obtained sample size in this study appears to be adequate and the response rate is also comparable to many contact center studies that have used managers and

senior executives as their study sample. In those studies, their respective response rates were between 15 and 49 per cent.[6,4,16,17,21]

Out of the 173 respondents, 103 answered through the mail questionnaire, whereas the remaining 70 responded through the Web. To avoid multiple responses from the same company, the researcher did compare the respondents from the online and mail on key variables such as their annual revenue, experience, number of employees and so on. The results showed that those who responded to mail questionnaire are different from those who responded to the online questionnaire.

## Measurements

The usual rating scales for measuring the latent construct in social science research were used in this current study.[34] The researchers have structured all constructs in the measuring instrument to use seven-point Likert scale, including the independent, mediating and the dependent variables. This is despite the fact that some other studies have argued on the benefits inherent in a five-point scale, but still a seven-point Likert scale is said to provide detailed feedback and does not subject respondents to any undue cognitive burden.[34] The business performance variables such as FCR and caller satisfaction were measured by asking the call center managers the percentage of their 2009 callers surveyed that reported top box 'satisfaction' and 'FCR' on a seven-point Likert scale ranging from 1 = below 40 per cent to 7 = above 90 per cent.

The word 'top box' is an industry term that was used in the survey as the highest level of caller satisfaction and first calls resolution that the selected companies have measured in their caller satisfaction and FCR surveys. Table 1 aptly summarizes the respondent's profile.

## Data analysis

Consistent with the available literature on structural equation modeling (SEM) and many scholarly recommendations, this study deems it fit to adopt a two-step model-building method as previously adopted by Yim *et al* and Kantsperger and Kunz[17,23] both conducted within the inbound units of the contact center industry. The first step involved the exploratory factor analysis (EFA) to purify and validate untested new measurement scales, and the second step, which involved confirmatory factor analysis (CFA), is meant to validate pre-existing measurement scales within the context of the current study.[35,36]

At the onset of this study, the researcher developed a set of ratio scales to measure the individual contact center performance in terms of their FCR and caller satisfaction. But the proposed ratio scale was turned down by the chosen managers at face value as being a subject of privacy and confidentiality. This group of experts alternatively suggested that it is best to use the industry standard, which might ask the managers to rate their company's performance on the basis of their previous customer survey. These managers' suggestions are theoretically in line with previous studies such as Yim *et al*, Feinberg *et al* and Kantsperger and Kunz[17,20,23] that all asked managers to rate their company's performance on the basis of the percentage of their callers surveyed that report top box FCR and caller satisfaction. The 'top box' FCR and caller satisfaction refer to the callers who reported they were extremely satisfied with the outcomes of their calling, and this primarily depends on whatever rate that each company wants the top score to be measuring.

# EMPIRICAL RESULTS

For this study, the researchers have made use of a multi-attribute approach in measuring knowledge management and

**Table 1:** Profiles of the respondents

| *Variable* | *Category* | *Number of cases* | *Percentage* |
|---|---|---|---|
| Gender | Male | 97 | 57.7 |
| | Female | 71 | 42.3 |
| Industry | Manufacturing | 18 | 10.7 |
| | Wholesale | 52 | 31.0 |
| | Services | 94 | 56.0 |
| | Others | 4 | 2.3 |
| Revenue | Between RM100, 000 and RM900, 000 | 17 | 10.1 |
| | Between RM1M and RM9, 900 000M | 71 | 42.3 |
| | RM10M and above | 80 | 47.6 |
| No. of employees | Below 100 | 15 | 8.9 |
| | 101–500 | 57 | 33.9 |
| | 501 and above | 96 | 57.1 |
| Years of working experience | <5 years | 30 | 17.9 |
| | Between 5 and 10 years | 78 | 46.4 |
| | Between 10 and 20 years | 49 | 29.2 |
| | Above 20 years | 11 | 6.5 |
| Qualification | No certification held | — | — |
| | Primary school certificate | 11 | 6.5 |
| | School certificate/SPM | 25 | 14.9 |
| | Tertiary school certificate | 71 | 42.3 |
| | Postgraduate degrees | 61 | 36.3 |
| Age | Between 18 and 35 years | 94 | 55.9 |
| | Between 36 and 45 years | 60 | 35.7 |
| | Between 46 and 55 years | 10 | 6.0 |
| | Over 55 years | 4 | 2.4 |
| Position | Senior vice president | — | — |
| | Vice president | 1 | 0.6 |
| | Call center manager | 98 | 58.3 |
| | Operation manager | 51 | 30.4 |
| | Others | 18 | 10.7 |

technology-based CRM as propounded by Sin *et al.*[16] Importantly, both knowledge management and technology-based CRM are measured using a 20-item scale. Through principal components factor analysis, Table 2 shows that 52.10 per cent of the variance in knowledge management is explained by the scale and all the items are greater than the prescribed 0.5. Reliability for both knowledge management and technology-based CRM was obtained using Cronbach's α. For knowledge management, its Cronbach's α was 0.896. In technology-based CRM, 63.49 per cent of its total variance is explained by the 10-item scale, similarly the entire factor loadings for these 10 items are greater than the suggested 0.5 cut off criterion. The Cronbach's α for technology-based CRM is higher at 0.936. This empirically shows that Cronbach's α for both the independent variables is above the recommended 0.7 cut-off criterion as suggested by Hair *et al.*[37]

Sequel to the above process, a CFA was then conducted on both knowledge management and technology-based CRM using AMOS 16,[35] with the primary aim of using EFA to test the convergent validity for both constructs as indicated in Table 2. This study made use of the suggested fit indices by Eid, Byrne and Hair *et al*[15,35,37] in assessing its model adequacy. This is because they all argued that the convergent validity of any CFA analysis ought to be supported by the

**Table 2:** Validity results – convergent

| *Variable/code* | *Attribute* | *Factor loading* | *Variance explained (%)* | *Cumulative variance explained (%)* | *Cronbach α* |
|---|---|---|---|---|---|
| *Knowledge management* | | | | | |
| KM1 | Employees' willingness to help customers in a responsive manner | 0.719 | 52.10 | 52.10 | 0.896 |
| KM2 | Understands the needs of key customers via knowledge leaning | 0.683 | — | — | — |
| KM3 | Customer could expect what time the services would be performed | 0.791 | — | — | — |
| KM4 | Provides opportunities to enable two ways communication with the customers | 0.776 | — | — | — |
| KM5 | Customers can expect prompt service from employees | 0.562 | — | — | — |
| KM6 | Sharing customer information across all points of contact | 0.588 | — | — | — |
| KM7 | New knowledge acquired at various touchpoints is codified, disseminated and shared easily amongst all staff | 0.530 | — | — | — |
| KM8 | Believes mining data intelligently is a source of competitive advantage | 0.566 | — | — | — |
| KM9 | Knowledge is shared to leverage the value of customer information | 0.760 | — | — | — |
| KM10 | Have sound mechanisms for effective knowledge dissemination | 0.538 | — | — | — |
| *Technology based CRM* | | | | | |
| TCRM1 | Have the right technical personnel to provide technical support for the utilization of computer technology in building customer relationships | 0.630 | 63.49 | 63.49 | 0.936 |
| TCRM2 | Has the right software to serve our customers | 0.651 | — | — | — |
| TCRM3 | Has the right hardware to serve our customers | 0.670 | — | — | — |
| TCRM4 | Individual customer information is available at every point of contact | 0.729 | — | — | — |
| TCRM5 | Maintaining a comprehensive database of customers | 0.712 | — | — | — |
| TCRM6 | Computer technology can help create customized offerings to customers | 0.722 | — | — | — |
| TCRM7 | Information systems are designed to give comprehensive data about all aspects of customers, so as to be responsive to customer | 0.747 | — | — | — |
| TCRM8 | IT facilitates the management of customer relationships | 0.856 | — | — | — |
| TCRM9 | Has the technical expertise and resources to succeed in CRM | 0.812 | — | — | — |
| TCRM10 | Have mechanisms to encode new knowledge about customers into formal rules or policies that can be shared between organizational participants and organizational subunits | 0.797 | — | — | — |

**Table 3:** Variance extracted

| *Variable* | *Code* | *SMC* | *SMC2* | *SE* | *VE* |
|---|---|---|---|---|---|
| Knowledge management | KM1 | 0.405 | 0.164025 | 0.005 | 0.979 |
| | KM2 | 0.577 | 0.33293 | 0.006 | |
| | KM3 | 0.664 | 0.440896 | 0.005 | |
| | KM4 | 0.486 | 0.236196 | 0.006 | |
| | KM5 | 0.494 | 0.244036 | 0.005 | |
| | KM6 | 0.448 | 0.200704 | 0.005 | |
| | KM7 | 0.268 | 0.071824 | 0.004 | |
| | KM8 | 0.521 | 0.271441 | 0.004 | |
| | KM9 | 0.333 | 0.110889 | 0.004 | |
| | KM10 | 0.469 | 0.219961 | 0.006 | |
| | — | — | 2.292902 | 0.05 | |
| Technology-based CRM | TCRM1 | 0.532 | 0.283024 | 0.004 | 0.990 |
| | TCRM2 | 0.590 | 0.3481 | 0.003 | |
| | TCRM3 | 0.610 | 0.3721 | 0.004 | |
| | TCRM4 | 0.627 | 0.393129 | 0.004 | |
| | TCRM5 | 0.592 | 0.350464 | 0.004 | |
| | TCRM6 | 0.646 | 0.417316 | 0.003 | |
| | TCRM7 | 0.586 | 0.343396 | 0.004 | |
| | TCRM8 | 0.660 | 0.4356 | 0.003 | |
| | TCRM9 | 0.548 | 0.300304 | 0.004 | |
| | TCRM10 | 0.560 | 0.3136 | 0.004 | |
| | — | — | 3.557033 | 0.037 | |
| First call resolution | FCR | 0.344 | 0.118336 | 0.004 | 0.967 |
| Caller satisfaction | CS | 0.506 | 0.256036 | 0.004 | 0.985 |

reliability of its items, its construct reliability and the average variance that is calculated from the variance extracted.[15,35,37] Table 2 summarizes the results of the EFA for both knowledge management and technology-based CRM.

This study has taken precaution to avoid common method bias, which is argued to have been majorly caused by items characteristics, specifically through the use of same respondents for both the dependent and the independent variables.[35] Strong argument in support of this type of bias is that it will generate significant artificial covariance. Fornell and Larcker[38] suggested that for researchers to prevent the error in common method bias, there is the need to separately measure the predictor and the criterion variables through different sources. For this study, common method bias was prevented through measuring predictor variables on the basis of managers' opinion on the impacts of knowledge management and technology-based CRM on their operational activities, whereas the criterion variables were asked on the basis of the outcome of their 2009 customer satisfaction and FCR survey.

As indicated in Table 3, the values of the variance extracted, which are the estimates that measure the amount of variances that each construct captured, range from 0.967 to 0.990 – as calculated through the squared multiple correlation (SMC) and the standard error of variance (SE). The results in Table 3 show that the variance extracted for all the four constructs was $>0.5$ as suggested by Hair *et al.*[37] The values for SMC and SE were all extracted from the AMOS 16 outputs. Table 4 summarizes the average variance extracted (AVE), which is the variance of the indicators that is explained by each factor in the model.

As suggested by Byrne,[35] an AVE that is above 0.50 should be treated as an indication of convergent validity and as showing that the validity of each construct and variables in the model is high. Notably,

**Table 4:** Discriminant validity – AVE

| *Name of variables* | *TBC* | *KM* | *FCR* | *CS* |
|---|---|---|---|---|
| Technology-based CRM (1) | 1.000 | — | — | — |
| Knowledge management (2) | 0.985 | 1.000 | — | — |
| First Call resolution (3) | 0.979 | 0.973 | 1.000 | — |
| Caller satisfaction (4) | 0.988 | 0.982 | 0.976 | 1.000 |

*Abbreviations*: CS, caller satisfaction; FCR, first call resolution; KM, knowledge management; TBCRM, technology-based CRM.

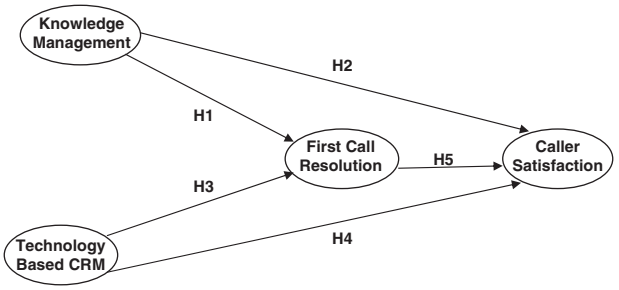


**Figure 1:** The conceptual model for this study.

the AVE in most existing studies usually varies from 0 to 1 and normally represents the output of the ratio as obtained from the total variance that is due to each latent variable as shown in Table 4. For this study, the results in Table 4 indicated that the ratio for all the latent variables was above the suggested 0.50, generally ranging from 0.973 to 0.988. The results in Table 4 statistically confirmed that the validity of knowledge management, technology-based CRM, FCR and caller satisfaction was all high.

Sequel to the above, this study went further to test the proposed conceptual model as shown in Figure 1 by using the following four constructs: knowledge management, technology-based CRM, FCR and caller satisfaction. The above 20 measurement items in Table 2 were used in measuring both knowledge management and technology-based CRM, whereas FCR and caller satisfaction were both measured by one observed variable that is based on the outcomes of their 2009 customer survey as mentioned earlier.

Employing the 22 measurement items as the input, this study conducted SEM analysis by examining the relationships that exist between each of the pairs of constructs as they have been hypothesized above. Figure 2 depicts the results of the SEM analysis; the fit indices for each variable in the model are summarized in Table 5.

As can be seen in Table 5, SEM result for the overall model shows that the $\chi^2$ statistic is very small at 23.362 with 23 degrees of freedom and an insignificant *P*-value of 0.440. 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.[35] Inability to achieve a *P*-value that is $>0.05$ and a ratio of $\chi^2$ to degree of freedom that is $<5$ will technically lead to the rejection of the model as stipulated in the goodness of fit indices of any SEM analysis.[35,36] Notably, the ratio of $\chi^2$ to the degree of freedom in this study is 1.016, a value that is far smaller than the suggested $<5$, which is prescribed to achieve goodness of fit indices.[37] The

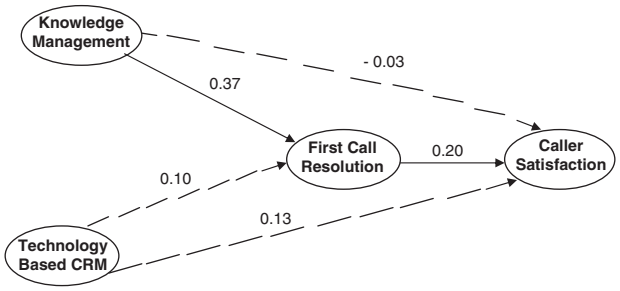


**Figure 2:** The results from the estimated structural model for this study.

**Table 5:** Goodness of fit index for the model

| *Final models* | *Criteria* | *Indicators* |
|---|---|---|
| CMIN/DF | <5 | 1.016 (23.362/23) |
| *P*-value | >0.05 | 0.440 |
| GFI | >0.9 | 0.967 |
| CFI | >0.95 | 0.999 |
| AGFI | >0.9 | 0.936 |
| NFI | >0.9 | 0.954 |
| RMSEA | <0.05 | 0.010 |

results in Table 5 have statistically shown that the model in this study is acceptable.

Also of importance are the other indicators to achieve goodness of fit in any model, such as GFI: 0.967, CFI: 0.999, AGFI: 0.936, NFI: 0.954, RMSEA: 0.010 to mention a 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 very well.

The results as observed from Figure 2 show that most of the hypotheses are supported by our conceptual model, except for knowledge management (Hypothesis 2) that is negatively related to caller satisfaction. But this negative relationship in Hypothesis 2 was offset by the mediating impact of FCR (Hypothesis 5) on caller satisfaction. Table 6 empirically shows that the standardized indirect estimate (0.074) in Hypothesis 5 is positive and greater than the standard direct estimates in Hypothesis 2 (−0.032). Technology-based CRM positively affects both FCR and caller satisfaction, namely TBCRM to FCR (Hypothesis 3) with (standardized estimate 0.10, *P*, 0.378), TBCRM to CS (Hypothesis 4) (standardized estimate 0.13, *P*, 0.835) but none between Hypothesis 3 and Hypothesis 4 is statistically significant at 5 per cent. Similarly, knowledge management positively affects FCR (Hypothesis 1) with a standardized estimate of 0.37, *P*, 0.01, further establishing knowledge management as having positive and significant relationship between with FCR. This positive and significant relationship also applies to FCR to CS (Hypothesis 5) with a standardized estimate of 0.20, *P*, 0.29, a result that confirms the findings in Feinberg and colleagues[13,20] and some industry reports that argued in favor of FCR as the major determinant of caller satisfaction within the contact center industry.[9,19] Thus, the above findings arguably provide empirical support to the existing academic literature and practical anecdotal evidence that have stated that getting customer information – specifically, information on personal and transactional data such as complaints, enquiries, claims and feedbacks significantly – plays a major role in achieving FCR and improving caller satisfaction. Importantly, the above two significant relationships have provided the required empirical support for those theoretical views that have stated that customer knowledge management is an important input to the management of any relationship marketing strategies.[4,16,25] CRM technologies on their part are good

**Table 6:** Indirect effects interpretations

| *Hypotheses* | *Exogenous* | *Mediated* | *Endogenous* | *Direct effects estimates* | *Indirect effects estimates* | *Mediating hypothesis* |
|---|---|---|---|---|---|---|
| Hypothesis 1 and Hypothesis 5 | KM→ | FCR→ | Caller satisfaction | −0.032 | 0.074 | Mediating |
| Hypothesis 3 and Hypothesis 5 | TBCRM→ | FCR→ | Caller satisfaction | 0.127 | 0.020 | Not mediating |

*Abbreviations*: FCR, first call resolution; KM, knowledge management; TBCRM, technology-based CRM.

**Table 7:** Summary of the hypothesis testing results

| *Hypotheses* | *Relationship* | *Testing results* |
|---|---|---|
| Hypothesis 1 | Knowledge management→first call resolution | Supported |
| Hypothesis 2 | Knowledge management→caller satisfaction | Not supported |
| Hypothesis 3 | Technology-based CRM→first call resolution | Not supported |
| Hypothesis 4 | Technology-based CRM→caller satisfaction | Not supported |
| Hypothesis 5 | First call resolution→caller satisfaction | Supported |

**Table 8:** Direct effects of revised model

| | *Endogenous* | *Exogenous* | *Estimate* | *SE* | *CR* | *P* | *Label* $R^2$ |
|---|---|---|---|---|---|---|---|
| Hypothesis 1 | FCR | ←KM | 0.535 | 0.208 | 2.576 | 0.010** | Sig. |
| Hypothesis 2 | CS | ←KM | −0.053 | 0.254 | −0.208 | 0.835 | Not sig. |
| Hypothesis 3 | FCR | ←TBC | 0.153 | 0.211 | 0.724 | 0.469 | Not sig. |
| Hypothesis 4 | CS | ←TBC | 0.220 | 0.250 | 0.881 | 0.378 | Not sig. |
| Hypothesis 5 | CS | ←FCR | 0.225 | 0.103 | 2.186 | 0.029** | Sig. |
| FCR | — | — | — | — | — | — | 0.202 |
| CS | — | — | — | — | — | — | 0.063 |

*$P<0.10$, **$P<0.05$, ***$P<0.01$.

*Abbreviations*: CS, caller satisfaction; FCR, first call resolution; KM, knowledge management; Not sig., not significant; Sig, significant; TBCRM, technology-based CRM.

facilitators for customer service agents in personalizing and customizing their customer service activities to the current and potential customers.[21,27] The above results, as interpreted in Table 7, show that how efficiently a company is able to make use of its customer's information will greatly determine the percentage of its callers whose issues will be resolved on the first call, subsequently improving their satisfaction.

Indeed, the results as listed in Table 8 have indicated that the customer service agents in the contact centers have a significant role to play in achieving FCR and caller satisfaction. Thus, the above findings strongly support the empirical findings in Feinberg and colleagues,[13,20] and industry reports by Callcentre.net and SQM G.C.[9,19] that have all argued that a mere use of knowledge management and CRM technologies will not automatically lead to caller satisfaction. Rather, the truth remains that the use of customer information and CRM technology will only enable the implementation of a set of interactive customer service activities that will assist in achieving the desired level of FCRs that would lead to caller satisfaction. Although CRM technologies could be referred to as a key enabler,[15] argued that they are only a means to the desired end. Therefore, the ability of the customer service agents in making efficient use of customer information through knowledge management and CRM technology applications will significantly play a critical role in the successful achievement of FCR and caller

satisfaction within the customer contact center industry. For further verification, please refer to Table 7 for the summary of the hypotheses testing results.

## CONCLUSION AND IMPLICATIONS

A critical analysis of the findings above in Tables 7 and 8 has shown that this study has provided a new theoretical ground upon which the determinants of caller satisfaction could be studied. It has empirically provided practical guidelines to the call center and contact center managers through a number of variables that are essential to their operational processes if they are to survive the current global financial constraints and market competitions. Through a detailed review of the extant literature and critical empirical assessment of the impacts of knowledge management and technology-based CRM on FCR and caller satisfaction, this research has extensively contributed to knowledge both practically and academically.

Overall, both measurement variables, that is, knowledge management and technology-based CRM, explain 20.2 per cent of the variance in FCR. A closer look at the results in Table 8 shows that knowledge management is statistically significant to FCR at 5 per cent confidence level. The interpretation in Table 7 empirically supports the assertion that knowledge management is a major determinant of FCR.

Practically, this finding has a major impact and implications for the call center managers, because its findings equally support the notion that FCR is an efficient means to reduce cost of operation, improve cross-selling opportunities, improve employee job satisfaction and caller satisfaction.[9,19] For example, employees' possession of customers' information through knowledge learning will greatly assist the company in anticipating customers' needs and requirements and will go a long way in reducing callbacks. Also of importance to call center performance is customer perceptions on their ability to receive prompt service by the customer service representative whenever they call the company. This is because in marketing, perception has a greater impact on expectation, while expectation will influence actual experience that will determine satisfaction and loyalty.[39]

Notably, this finding has empirically established that a company's capability in effectively acquiring a valid understanding of its current and potential customers' information through CRM technologies will positively impact its acquisitions, customization, management and retention of customers. Specifically for FCR, we observed that this is the first academic study that has empirically provided for its determinants based on call center knowledge management and implementations of technology-based CRM.

The aforementioned results empirically support the existing theoretical views of McNally, Dean and Feinberg *et al*[4,6,20] that customer knowledge learning and technology implementations within the inbound contact centers assist in ensuring caller satisfaction and loyalty by quickly solving customers' problems. The important question now is what is the relative significance of FCR to caller satisfaction? And if combined, to what extent does knowledge management, technology-based CRM and FCR explain the variance in caller satisfaction? Theoretically, it has been argued that any contact center that achieved an increased FCR would likely also experience lower cost in its operations, reductions in its repeat numbers of callers, reduction in the risk of its existing customers defecting to its competitors and finally achieving higher employee job satisfaction.[6,13] The importance of FCR is premised on the argument that if contact centers are faced with increased number of repeat calls from any group of frustrated

customers, such phenomenon will definitely strain its customer service representatives and invariably lead to decrease in its employee morale, poor customer service output, increase in caller dissatisfaction and employee turnover.[7,40]

In aggregate, findings from this study, as revealed in Table 8, show that the combined effect of knowledge management, technology-based CRM and FCR only account for 6 per cent of the variability in caller satisfaction, with only FCR that is statistically significant at (Hypothesis 5) with a standardized estimate of 0.20, *P*, 0.29. This result further confirms the findings in Feinberg *et al*[13] that established a weak relationship between FCR and caller satisfaction with an $R^2$ of 5 per cent. Observably, our strong argument is that within the operational variables, FCR is statistically significant, and positively mediates knowledge management applications. But of importance is that the customer contact centers are first touchpoints to a company's goods or services, and that many other factors such as product quality, company policy, target markets, decision-making processes and so on are also major determinants of caller satisfaction but fall outside the operational control of contact center activities.[41,42]

## LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

There are some limitations in this study as it applies to other studies. The first limitation is that the researchers have 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 that includes caller loyalty, cost minimizations (profits, labor turnovers and so on), employee satisfaction;[6,23] consequently, this study cannot generalize its findings in all the constructs of contact center successes and across countries. Very important among the suggestions for future research that emerge from this study is the need for upcoming researchers to thoroughly investigate each of the hypothesized variables as previously conceptualized in the literature. This we believe will greatly assist in identifying any missing items that could further help in determining the observed variables. And in case any researcher would like to adapt this model to determine CRM impacts on their contact center performance constructs, we strongly suggest that they should include customer orientation and CRM organization as originally conceptualized by Sin *et al*.[16] Doing this, we believe, will empirically assist in capturing every unit of customer relationship management constructs, as argued in the extant relationship marketing literature. Taking all the aforementioned into consideration, we finally suggest that a promising research will be the one that would incorporate the impact of product quality and company policy on FCR, employee job satisfaction and caller satisfaction within the contact center operational activities. This area of research is very important and strongly premised on the overt evidence that the efficiency of the customer contact centers greatly depends on FCR, perceived service quality, employee job satisfaction and customer satisfaction.

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