eCRM capabilities of SME’s: A model and its relationships

Paul O Harrigan, University of Ulster
Andreas Schroeder, City University of Hong Kong
Israr Qureshi, Hong Kong Polytechnic University
Yulin Fang, City University of Hong Kong
Elaine Ramsey, University of Ulster, et al.
Abstract

Organizations today have a diversity of applications available to support the management of customer relationships, namely electronic-customer relationship management (eCRM) applications. Despite the growing need of understanding eCRM in small and medium-sized enterprises (SMEs), eCRM research is largely focused on large organizations. Building on the theory of dynamic capabilities, this paper examines the relationships among use of the internet infrastructure, eCRM capabilities, and their resulting benefits through a survey across 286 SMEs in Ireland. Findings present significant theoretical and practical contributions. It is posited that the ICT infrastructure strongly impacts eCRM capabilities of SME’s. Further, it is posited that the level of ICT use impacts on eCRM capabilities. Ultimately, the more proficient the eCRM capabilities, the higher the levels of benefits recorded for SME’s. Our eCRM focused study provides a valuable theoretical contribution and also aims to inspire further research in the SME context of this important area.

Keywords: Electronic-Customer Relationship Management (eCRM), SME, Ireland.
1 INTRODUCTION

Managing customer relationships is one of the most critical activities of an organization. Customer relationship management (CRM) defines ‘the cross-functional integration of processes, people, operations, and marketing capabilities’ (Payne and Frow, 2005:168), which aims at ‘creating improved shareholder value through the development of appropriate relationships with key customers and customer segments’ (Payne and Frow, 2005:168). A range of software applications are available which support the CRM objectives. Such electronic-Customer Relationship Management (eCRM) applications are increasingly used by organizations to build or extend their relationships with customers (Coltman, 2007).

Creating and maintaining relationships with customers is of particular importance for small- and medium enterprises (SME’s). Responding to customers with flexibility and adaptability is one of the key opportunities for SME’s to compete with larger counterparts (Tagliavini et al., 2001). However, customer relationships in SME’s are largely managed in a traditional way through costly face-to-face contact and handshakes without sophisticated software support (Ritchie and Brindley, 2005).

Today’s eCRM research is largely limited to large organizations focusing on their sophisticated software applications with little attention to SME’s needs (Koh et al., 2007). In practice, only a small percentage of SMEs have implemented sophisticated ICT to support CRM objectives (Ritchie and Brindley, 2005; Maguire et al., 2007). However, SME’s which want to compete in globalised economies cannot ignore CRM principles and the benefits derived from eCRM applications. It is therefore important to investigate the use of less sophisticated ICTs to manage customer relationships in SMEs? To address this research objective two research questions have been derived:

1) To what extent does ICT infrastructure influence the eCRM capabilities of an SME?
2) What are the performance consequences of ICT-enabled eCRM capabilities for an SME?

In order to answer these research questions an eCRM capability model is conceptualised and tested through a survey across 286 SMEs in Ireland.

2 LITERATURE REVIEW & THEORETICAL DEVELOPMENT

The present research draws on the theory of dynamic capabilities, the resource based view and the eCRM literature to develop a research model which conceptualizes eCRM in an SME context. Dynamic capabilities describe an organization’s ability to use ICT and complementary organizational resources for developing unique, change-oriented capabilities that enable organizations to respond to the market (Teece et al., 1997). ICT provides the building blocks to form capabilities, and an organization’s ability to enhance these capabilities leads to superior performance (Banker et al., 2006). Integrating dynamic capabilities theory with the CRM and SME literature, we posit that ICT enables the development of eCRM capabilities in SME’s which, in turn, lead to better SME performance benefits.

2.1 eCRM Capabilities

Customer relationships have been extensively investigated in the marketing and strategic management literature. The resource based view considers resilient relationships with customers as a core strategic resource of an organization (Barua et al., 2004; Mithas et al., 2005). Unlike several other organizational resources, strong customer relationships are sustainable, not easily imitable by competitors (O’Toole, 2003; Sambamurthy et al., 2003), lead to a higher premium (Harrison-Walker and Neeley, 2004), facilitate cross-selling and save organizations the high costs associated with identifying customers (Tan et al., 2002). Due to these various benefits associated with strong customer relationships, CRM constitutes one of the core objectives of today’s organizations (Sambamurthy et al., 2003).

eCRM capabilities describe the use of ICT in the management of customer relationships. In the CRM context ICT allows for an efficient processing of customer data (Brady et al., 2002), a wide geographical reach (Javalgi and Ramsey, 2001) and for cost-effective forms of interaction between the organization and its customers (Schroder and Madeja, 2004; Kim and Umanath, 2005). The diversity of ICT and internet-based technologies provides organizations with two eCRM capabilities: the capability to manage...
customer information (Jayachandran et al., 2005; Kim et al., 2006; Padmanabhan et al., 2006) and the capability to communicate with customers (Brady et al., 2002; Tan et al., 2002; Day and Hubbard, 2003).

The customer information management capability focuses on the ability of ICT to assist in the administration, storage and processing of customer data. CRM tools are used for capturing and integrating customer-details (Bradshaw and Brash, 2001; Padmanabhan and Tuzhilin, 2003). Tools and systems which provide organizations with such an information management capability and which are commonly considered in an eCRM context include customer databases and data warehouses. Other authors refer to these tools as back-office or analytical CRM tools (Ang and Buttle, 2006).

The communication capability describes the ability of ICT to facilitate the interaction between the organization and its customers. A range of tools provide efficient and cost-effective ways to communicate with customers. Tools and technologies which are commonly highlighted for their ability to support the CRM objectives include the use of email communication (Tan et al., 2002), websites (Geiger and Martin, 1999) and chat-rooms (Romano and Fjermestad, 2003). Other, more sophisticated communication tools include automated response engines for web-based queries or advanced call-center software (Boulding et al., 2005). Other authors refer to these tools as front-office or operational CRM tools (Ang and Buttle, 2006).

Customer information management and customer communication describe the ICT enabled capabilities that support the organizational CRM objectives (Brady et al., 2002). In organizations these two capabilities are provided through generic tools outlined above or by dedicated CRM software packages such as Goldmine FrontOffice, Siebel or Onyx Customer Center (Tan et al., 2002).

2.2 Towards an eCRM Capability Research Model for SMEs

Most of these sophisticated CRM applications are not suitable for SMEs which lack resources, expertise and long term orientation (Street and Meister, 2004, Bili and Raymond, 1993; O’Toole, 2003). SMEs are more likely to use generic tools and applications to manage customer information and customer communication and their eCRM capabilities cannot be determined by their use of dedicated CRM software. Hence, an eCRM capability model for SMEs needs to be based on generic software tools such as email, internet and generic databases (see figure 1).

![Figure 1. Research model](image-url)

To determine the impact of ICT on eCRM capabilities the level of technological sophistication of SMEs needs to be characterised. By adopting Nambisan and Wang’s (1999) ICT stage model to the eCRM-context one can specify the sophistication of SMEs’ ICT-based practices through: Internet infrastructure,
Internet-based information presentation, Internet-based business transaction, and Internet-based customer information integration. The impact of these ICT based practices is subsequently hypothesized:

The basic internet infrastructure has often been considered with its impact on organizational capabilities and practices of SME’s (Spurge and Roberts, 2005). The quality of the internet connection affects the data exchange capacities of SME’s (Koh et al., 2007) and hereby impacts the development of business models (Jutla et al, 2002). Since connectivity is the critical infrastructural requirement for technology based customer interaction it can be expected that the quality of the internet connection impacts the development of the eCRM capability of SME’s:

**H1:** The better the internet infrastructure, the better (a) the Internet-based customer information management of SMEs, and (b) the Internet-based customer communication of SMEs.

The internet based presentation of product information constitutes one of the dominant internet uses of SMEs (Egan et al, 2003). Maintaining these websites creates the opportunity for SMEs to provide up-to-date information to customers (Geissler, 2001). Considering the importance of presenting customers with current information, a relationship between website maintenance and the eCRM capabilities can be hypothesized:

**H2:** The better the website information is maintained, the better (a) the Internet-based customer information management for SMEs, and (b) the Internet-based customer communication for SMEs.

Internet based business transactions are very common among larger organizations but are less common for SMEs (Brown and Lockett, 2004). However, using the internet for transactions with customers provides opportunities for digitizing customer information (Bauer et al., 2002) and improving relationship with customers (Chaston and Mangles, 2003). Hence, it can be hypothesized that the extent of internet based business transaction impacts the eCRM capabilities of SMEs.

**H3:** The more transactions with customers via the Internet, (a) the better the Internet-based customer information management and, (b) the better the Internet based customer communication for SMEs.

The integration stage focuses on the interleaving of the internet and business processes of an SME. Such integration is not yet achieved in many SMEs (Brown and Lockett, 2004). Still, integration between internet and business processes allows organizations to be faster and more seamless in the response to customers (Egan et al, 2003). As it facilitates managing customer information and interaction a relationship between the SMEs’ internet integration and eCRM capabilities can be hypothesized:

**H4:** The higher the level of internet integration with organizational systems, the better (a) the Internet-based customer information management, and (b) the Internet- based customer communication for SMEs.

Organizational capabilities identify resources and practices which provide organizations with opportunities for the creation of particular benefits and outcomes. Focusing on eCRM capabilities a range of benefits have been identified such as enhanced customer service (Letefia and Perrien, 2007), improved customer loyalty (Morgan, 2007; Warrington et al, 2007) or market awareness (Hamid, 2005; Kotorov, 2002). A relationship with the eCRM capabilities of SME’s can be expected.

Sophisticated information management practices create a high level of internal efficiency in dealing with customer related data and information. Internal efficiency describes the internal operations of a firm (Edvardsson and Enquist, 2006). A high degree of internal efficiency allows organizations to not only organize customer information in a competent way, but also to perform analytical processes which create a better understanding of individual customer as well as the entire customer base. Hence, an impact of the customer information management on the benefits associated with eCRM can be expected:

**H5a)** The better the Internet-based customer information management, the higher the level of eCRM performance benefits.

Establishing internet-based communication with customers contributes to the organizations external efficiency, the customer perceptions of the organisation (Edvardsson and Enquist, 2006). Identifying the appropriate communication means allows an organization to better address customer needs and better utilize communication resources. Hence, an impact of the customer communication on eCRM benefits can be hypothesized:
H5b) The better the Internet-based customer communication in SMEs, the higher the level of eCRM performance benefits.

3 METHODOLOGY

A survey method based on Saris and Gallhofer (2007) and Dillman (2007) was used to test the above hypothesis. The survey measured organizations internet infrastructure, eCRM capabilities and eCRM benefits and established constructs were used where possible. A pre-test was conducted for ensuring the instrument’s validity and reliability. A detailed description of the final survey items and their sources are provided in the Appendix A.

North Ireland was chosen as the research locale for the present investigation. This choice was based on the relative importance of SME’s for the national economy (BERR, 2005) and the widespread availability of broadband internet (Richardson, 2005). Sampling focused on SME’s employing less than 250 employees (European Commission, 2005) and it was verified that the organisations possess a website and valid email address. Stratified random sampling by sector was employed to represent sub-sectors of the wider service sector (i.e. retail: 38%, professional service: 31%, service: 25%, wholesale: 6%). Within each stratum, randomization was achieved by selecting every nth firm matching the sampling frame criteria. The owner-manager was identified as the most appropriate source of information in the SME and was used as the point of contact and investigation. Based on the Mann-Whitney U-test no bias in the data set was identified (Armstrong and Overton, 1977). The characteristics of participating SMEs are presented in the Table 1.

4 RESULTS

The dataset was carefully studied to identify any obvious statistical issues such as severe outliers, skewness and kurtosis. Although regression techniques in general and partial least squares in particular are robust to skewness, extreme skewness and/ or kurtosis may generate biased estimators (Cassel et al., 1999). Skewness for observed variables/ indicators was between -1 to +1 and kurtosis between -1.29 to +0.385. Only one variable, type of internet access, had slightly high kurtosis (2.7). To address leptokurticness of this variable log transformation was applied (Cohen and Cohen, 1983; Gibson and Cassar, 2002; Wagner et al., 2003). However, since results were the same with or without transformation of this variable, the results without transformation were preferred because of ease of interpretation.

We used PLS for analysis because our model involved three latent variables. In addition our model had two mediators and it is difficult to test using simple regression analysis. Structural equation modeling (SEM) is a more suitable technique for research model involving latent variables (Barclay et al., 1995). In addition, PLS is suitable technique for exploratory research such as ours (Barclay et al., 1995).

4.1 Measurement Model

We examined the loadings of each item on its intended construct; the cross-loadings of each item onto other constructs; the internal consistency reliability of the construct; the average variance extracted; and the overall discriminant validity of the construct from other constructs. We followed well established guidelines in the literature on PLS (Barclay et al., 1995; Carmines and Zeller, 1979; Gefen et al., 2000; Hulland, 1999; Shook et al., 2004).
Table 2: Table of loadings and cross-loadings for the items of latent variables

Table 2 shows that all of the items retained had loadings much greater than the recommended 0.7 cutoff (Carmines and Zeller, 1979). Table 3 shows the internal consistency reliabilities (ICR) for each of the reflective latent variable used in the research model which exceeds 0.91 for all the constructs. To test discriminant validity, criteria of average variance extracted (AVE) and matrix of loading and cross loading was used (Fornell and Larcker, 1981a). Square-root of AVE for all the constructs in this study exceeds the correlations of those constructs with other constructs (Table-3). Cross loadings on none of the items exceed the loading of items onto their own constructs (Table-2), hence all the constructs pass both the criteria of discriminant validity.

<table>
<thead>
<tr>
<th>Variables</th>
<th>ICR</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) CCC</td>
<td>0.91</td>
<td>0.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) CIMC</td>
<td>0.93</td>
<td>0.40</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) size</td>
<td>N/A</td>
<td>-0.26</td>
<td>-0.03</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) age</td>
<td>N/A</td>
<td>-0.08</td>
<td>0.23</td>
<td>0.47</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Int_access</td>
<td>N/A</td>
<td>0.16</td>
<td>0.22</td>
<td>0.05</td>
<td>0.31</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Int_based_bus</td>
<td>N/A</td>
<td>0.57</td>
<td>0.10</td>
<td>-0.31</td>
<td>-0.25</td>
<td>-0.01</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7) Update_freq</td>
<td>N/A</td>
<td>0.31</td>
<td>0.29</td>
<td>0.03</td>
<td>0.14</td>
<td>0.04</td>
<td>0.21</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) CII</td>
<td>N/A</td>
<td>0.42</td>
<td>0.26</td>
<td>-0.19</td>
<td>-0.04</td>
<td>0.17</td>
<td>0.25</td>
<td>0.40</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>(9) ECB</td>
<td>0.93</td>
<td>0.63</td>
<td>0.48</td>
<td>-0.19</td>
<td>-0.04</td>
<td>0.09</td>
<td>0.40</td>
<td>0.27</td>
<td>0.27</td>
<td>0.82</td>
</tr>
</tbody>
</table>

Discriminant validity requires that a given construct to be different from other constructs. This can be tested by criteria that root of AVE for a construct should be greater than the correlation of that construct with other constructs in the research model. Another criteria used for testing discriminant validity is that loadings of the items of a construct should be higher than their cross loadings on other constructs (Barclay et al., 1995; Fornell and Larcker, 1981a, b).
CCC - customer communication capability; CIMC- customer information management capability; ECB – eCRM benefits; CII – Customer information integration;

Table 3: Correlation Matrix and Composite Reliability

4.2 Structural Model

Figure 2 provides the results of the structural model. All the hypotheses except H2a were supported. H1a was supported ($\beta=0.109$, $t=1.98$). Thus, quality of basic internet infrastructure positively predicted the internet-based customer information management of SMEs.

Hypothesis 1b was supported ($\beta=0.106$, $t=2.51$); quality of the basic internet infrastructure positively predicted the Internet-based customer communication of SMEs.

Hypothesis 2a, which stated that increased website maintenance positively impacts the Internet-based customer information management for SMEs, was not supported ($\beta=0.04$, $t=0.65$). However, hypothesis 2b was supported ($\beta=0.449$, $t=9.56$) i.e. website maintenance positively predicted the Internet-based customer communication for SMEs.

Hypotheses 3a and 3b were also supported: Internet-based business transaction positively predicted customer information management ($\beta=0.194$, $t=3.63$) and internet-based customer communication ($\beta=0.115$, $t=2.23$).

Similarly, hypothesis 4a ($\beta=0.139$, $t=2.1$) and 4b ($\beta=0.221$, $t=4.59$) were supported. Thus, level of internet integration with organizational systems positively predicted the Internet based customer information management and Internet based customer communication for SMEs.

Finally, hypothesis 5a, which stated that the better the Internet-based customer information management in SMEs, the higher the level of eCRM benefits, was supported ($\beta=0.288$, $t=5.02$). Similarly, hypothesis 5b was supported ($\beta=0.504$, $t=10.11$) i.e. Internet-based customer communication in SMEs positively predicted the level of eCRM benefits.

**Figure 2: Path coefficients and $R^2$**

Figure 2 also provides $R^2$ values for all the three dependent variables, which are reasonably high. Our model explains 44.7% variance in customer communication capability, 20.2% variance in customer information management capability (CIMC) and 46% variance in eCRM benefits (ECB).
information management capability and 46% variance in e-CRM benefits. These figures are reasonably high considering the parsimonious nature of our model2.

5 DISCUSSION

The results of this study suggest that the level of ICT use (i.e. connectivity, informational, transactional and integration) relates to the eCRM capabilities of SMEs, with the exception of the link between website maintenance and customer communication capabilities. Results present a positive relationship between the proficiency of eCRM capabilities and the eCRM benefits reported by SMEs.

The support of hypotheses 1a and 1b suggests that more sophisticated internet infrastructure in SME’s relates to better customer information management and customer communication capabilities. Findings from this research concur with Rai et al. (2006) who found that internet infrastructure should not be considered as a low-level tangible physical resource but as complex and unique capabilities. In the case of the SME’s under investigation here the ICT infrastructure enables eCRM capabilities.

The rejection of hypothesis 2a specifies that no relationship between the level of website maintenance and the eCRM capability of customer information management is found. However, the acceptance of hypothesis 2b links website maintenance to customer communication. An explanation for this discrepancy may be that many SMEs are successfully maintaining websites only with an external focus to manage their customer communication (Geissler, 2001). SMEs appear not to be utilizing their websites as facilitators of a feedback loop which involves managing customer information as a basis for customer communication (Shah and Murtaza, 2005).

By accepting Hypotheses 3a and 3b the level of business transactions is linked to the customer information management and customer communication capabilities of SMEs. It can be concluded that those SMEs using a higher level of ICT based transactions have more proficient eCRM capabilities. This finding corroborates previous eCRM research that emphasises the significant role of transacting and selling via the internet for maintaining customer relationships (Bauer et al., 2002; Ragins and Greco, 2003).

Hypotheses 4a and 4b were also accepted which proposed that internet integration with organizational systems was positively related to the customer information management and customer communication capabilities. This finding supports Day and Hubbard (2003) who assert that a lack of integration can result in the disruption of previously stable customer relationships as roles of offline and online communication media are confused. Customer information must be integrated into every aspect of a firm’s operation or that information can become a redundant asset (Boulding et al., 2005).

The final two hypotheses relate to the benefits emanating from customer information management and communication capabilities. Hypotheses 5a and 5b were supported which proposed that better internet-based customer information management and better internet-based customer communication in SMEs would lead to higher levels of eCRM benefits. This finding confirms previous research which has identified that eCRM based communication leads to enhanced customer service (Letaifa and Perrien, 2007) and increased personalization (Hamid, 2005). The SME’s in this study are underlining the importance of integrating a solid ICT infrastructure into CRM processes in order to facilitate eCRM capabilities. Ultimately, as Lawson-Body and O’Keefe (2006) have asserted: SMEs should treat the internet as more than just a basic communication tool, and use it as a tool to complement their existing customer orientation (Boulding et al., 2005).

2 We also analyzed our research model using covariance based SEM techniques (using AMOS 7.0 software). Maximum likelihood (ML) estimator provided a path coefficient that was consistent with those reported here. Squared multiple correlations (a equivalent measure of R2) obtained using ML estimator were also comparable. Some of our exogenous variables and control variables were ordinal, therefore we also used an unweighted least squares (ULS) estimator to see whether the results obtained using component-based SEM were consistent. The results using a ULS estimator were slightly different in the magnitude of coefficients but the significance level remained the same and there were no substantial differences in the inferences.
6  IMPLICATIONS AND FUTURE RESEARCH

This study provides valuable theoretical and practical contributions. Future research could test the model in other sectors and other countries where culture may influence technological integration and relationship building. Moreover, it would be interesting to conduct research along supply chains to investigate the impact of eCRM capabilities on supply chain partners. A practical implication of the study is the fact that it highlights the potential of generic ICT tools to support CRM objectives of organizations: to engage in systematic CRM activities SME’s do not need to invest in sophisticated tools but can already impact their customer relationships by the use of generic tools already present in most SME’s.

7  REFERENCES


## 8 APPENDIX A: CONSTRUCTS AND ITEMS

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Q#</th>
<th>Questionnaire Items</th>
<th>Adapted from</th>
<th>Developed from</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication with customers</strong></td>
<td>CCC1</td>
<td>Internet communication is key to our business. (E-mail is an example of Internet communication)</td>
<td>E-Business Watch e-Business Survey (2006)</td>
<td>Tan et al. (2002)</td>
</tr>
<tr>
<td></td>
<td>CCC2</td>
<td>We proactively use Internet communication to build customer relationships.</td>
<td>Lawson-Body and O’Keefe (2006)</td>
<td>Boyle (2001)</td>
</tr>
<tr>
<td></td>
<td>CCC3</td>
<td>Internet communication has improved communication as a whole with the customer.</td>
<td>Lawson-Body and O’Keefe (2006)</td>
<td>Tan et al. (2002)</td>
</tr>
<tr>
<td><strong>Information on Customers</strong></td>
<td>CIMC1</td>
<td>We have a database to store customer information.</td>
<td>E-Business Watch e-Business Survey (2006)</td>
<td>Tan et al. (2002)</td>
</tr>
<tr>
<td><strong>Internet Access</strong></td>
<td></td>
<td>What type of Internet access does your firm have</td>
<td>Lawson-Body and O’Keefe (2006)</td>
<td>Mithas et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>ECB6</td>
<td>Internet-enabled customer relationships generate more sales / transaction for us</td>
<td>Feinberg et al. (2002)</td>
<td>O’Toole (2003)</td>
</tr>
</tbody>
</table>

---

Koh et al. (2007)
Du Plessis and Boon (2004)
Kim et al. (2006)
Rai et al. (2006)