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The Customer Resource Life Cycle: An Empirical Validation

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Abstract

Many organizations implement IT to compete more successfully. The Customer Resource Life Cycle (CRLC) has been proposed as a framework for explaining how they do this. The current research investigated their use of IT in CRLC activities for this purpose. Four hundred seventy two managers responded to an e-mail survey about an IT application in the context of the CRLC. Statistical tests validated the CRLC's four stages. Requirements and Acquisition stages predicted Porter's three generic competitive strategies. Retirement predicted only one strategy.

Introduction

Many organizations implement IT to help them compete more successfully. To stimulate ideas for new IT, Ives and Learmonth (1984) proposed the Customer Resource Life Cycle (CRLC) model. The CRLC has four stages divided into thirteen sub-stages representing the activities of organizations to provide products (called resources) to customers. They asserted that the activities facilitated competitiveness by supporting Porter's (1980) three generic business strategies of focus, differentiation, and cost leadership.

However, research has neither validated the CRLC nor demonstrated that its activities actually facilitate those strategies. The current research thus sought to determine whether or not the CRLC can be used to assess how IT helps organizations compete. If it does, the CRLC might be used not only to help organizations stimulate ideas for new IT applications, but also to assess how well they already do so.

The Customer Resource Life Cycle: Using IT to Compete

Much of the research on the competitive benefits of IT investments originated with Porter's (1980) formulation of competitive strategies. Porter suggested that firms use three generic strategies of competitive action: focus on a particular market segment, differentiation of a product or service, and cost leadership.

Ives and Learmonth (1984) used Porter's strategies as a basis for a new framework, the CRLC. The CRLC

provides a way to classify, study, and thus understand existing, competitive applications. It also provides a means of conceptualizing and proposing new competitive applications.

The CRLC concentrates on the relationship between the provider of goods or services and the customer. From the customer's perspective, purchased products are resources. A customer must expend considerable time and effort to determine requirements for, acquire, manage, and eventually dispose of each resource. A provider may be able to differentiate itself from its competitors and gain competitive advantage by assisting its customers in managing this cycle.

Four stages comprise the CRLC. The first, *Requirements*, is made of *Establish requirements* and *Specify*. The second, *Acquisition*, has *Select source*, *Order*, *Authorize and pay for*, *Acquire*, and *Test and accept*. The third, *Stewardship*, has *Integrate*, *Monitor*, *Upgrade*, and *Maintain*. The last, *Retirement*, has *Transfer or dispose* and *Account for*.

Authors have often discussed the CRLC since the publication of Ives and Learmonth (1984). However, an extensive literature search revealed only one study where the CRLC model played a role in an empirical investigation (Sethi and King, 1994). That study operationalized a construct called Competitive Advantage Provided by an Information Technology Application (CAPITA) to measure the extent to which IT provides competitive advantage. The final instrument contained several, but not all items representing individual CRLC sub-stages.

Despite its limited use in empirical research, the CRLC still offers a framework for studying how organizations use IT to help them compete as well as a framework for understanding the impact of IT on competitiveness in terms of the three generic strategies. No previous research has examined these effects.

Methodology

A survey instrument included thirteen detail items to measure the extent to which an IT application - namely World Wide Web sites - helped customers accomplish the associated CRLC sub-stages and stages. It also contained three items to measure the extent to which the sites helped them realize Porter's generic strategies. Respondents

rated each item on a seven point scale where 1 was “very little” and 7 was “very much.” Additional items requested demographic information.

The authors pilot-tested the instrument with five local merchants who used Web sites for their businesses. They e-mailed the survey to 5,124 IS managers of companies listed on several Internet malls. A few days later, they sent a second to non-respondents. Four hundred and seventy two completed responses were received for a response rate of 9.2%.

The respondents averaged seven and a half years experience with their current company and about five subordinates reporting to them. Sixty-three percent had at least a four year college degree. Fifty-one percent had worked in marketing or sales while only 26% had worked in information systems.

Confirmatory Factor Analysis of CRLC Measures

Confirmatory factor analysis (CFA) examined the measurement properties of the CRLC model comprising the four latent factors (*Requirements*, *Acquisition*, *Stewardship*, and *Retirement*) and the thirteen observable variables (i.e., the CRLC sub-stages). The measurement model was repeatedly modified to improve its fit with the data.

A Kolmogorov-Smirnov test rejected the null hypothesis of data normality with a $p < .001$ level of significance. The EQS software program for CFA and structural equation modeling from Multivariate Software Inc. was used because it provides a robust option allowing non-normal data and using the maximum likelihood method of parameter estimation.

Selected goodness of fit measures were the Satorra-Bentler Scaled Chi-square (SBS χ^2), degrees of freedom (df), SBS χ^2/df ratio, Comparative Fit Index (CFI), and the Robust Comparative Fit Index (RCFI). The SBS χ^2 was chosen due to the data non-normality. A value of the ratio below 3 indicates a good fit. CFI and RCFI values greater than 0.9 also indicate a good fit.

After two rounds of modifications, *Test and accept* and *Select source* were dropped from the original model due to cross-loading with other latent factors.

Reliability and Validity Analysis

A test of composite reliability examined the internal consistency of the indicator variables in each factor. The composite reliability for each factor exceeded the minimum accepted level of 0.70.

T-tests for the standardized factor loadings of the indicator variables measuring each factor assessed convergent validity. All standardized factor loadings for the indicator variables measuring each factor had t-values statistically significant ($p < .001$).

Correlations between the factors were examined in an initial consideration of discriminant validity. All correlations were moderate, except for that between *Stewardship* and *Retirement*. Its correlation of 0.92 warranted further investigation. Three more tests were used to show support for discriminant validity.

A chi square difference test performs a pair-wise analysis to assess the discriminant validity between two factors. It involves setting the covariance of two factors to 1 and rerunning the model. The results of the Chi-square statistics for the new model are then compared to those of the final model from the CFA. The test provided evidence that the four factor model exhibits discriminant validity and is preferable to a three factor model.

A confidence interval test was also used to further investigate the final model's discriminant validity. This test involves calculating a confidence interval of plus or minus 2 standard errors around the correlation between 2 factors. The interval should not contain the value of 1. The intervals calculated for the final model did not contain 1. Hence the confidence interval test supported discriminant validity.

The variance extracted test uses the variance extracted estimates. A variance extracted estimate is the amount of variance explained by each of the factors in relation to the amount of variance due to measurement error. This test requires comparing the estimates with the square of the correlation between the two factors. Discriminant validity is demonstrated if both variance extracted estimates are greater than the square of the correlation. This was true for five of the six tests.

However, the square of the variance between *Stewardship* and *Retirement* was equal to 0.85. This value exceeded the variance extracted estimates for either of these factors. Thus, the variance extracted test indicated that these two factors might not be distinct.

In conclusion, two of the three tests provide support for discriminant validity. The four-factor model may hence be used with some confidence. However, the claim that *Stewardship* and *Retirement* are distinct factors is not as cogent as it might be.

Relationship to Porter's Generic Strategies

To investigate further whether the CRLC can be used to assess how IT helps organizations compete, a multivariate regression tested the relationship between the

CRLC stages and Porter's generic strategies. The Pillais test was significant ($p < .001$) permitting the interpretation of the three individual univariate regressions. Moreover, all three regressions were statistically significant ($p < .001$).

Furthermore, *Requirements* and *Acquisition* were statistically significant ($p < .01$) in all three regressions. *Retirement* was statistically significant ($p < .01$) for the low cost strategy. *Stewardship* had no significant impact on any of the three generic strategies.

Contributions and Implications for Research

This study makes several contributions to research. First, by testing the validity and reliability of the CRLC stages, it demonstrates the utility of the CRLC for assessing an IT application. Future researchers could use or further refine the items in subsequent studies of IT applications.

Perhaps a slight rewording of some of the items could improve the validity and reliability of the instrument even more, and permit the use of all thirteen original sub-

stages. In addition, a further rewording of the items in *Stewardship* and *Retirement* might better distinguish those two factors.

Further research might also produce an instrument with multiple items for each CRLC sub-stage. The lack of additional significant relationships, besides those in this study, might also merit investigation.

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