

Developed Model of Management of Successful Customer Relationship in the Context of Business Intelligence

Alireza Shahraki¹, Arsalan Dezhkam^{2*} and Rahil Dejkam¹

¹Department of Industrial Engineering, University of Sistan and Baluchestan, Iran;
shahrakiar@hamoon.usb.ac.ir, dejkam.rahil@gmail.com

²Department of Basic Sciences, Faculty of Marine Sciences, Chabahar Maritime University, Iran;
dejkam@cmu.ac.ir

Abstract

Background/Objectives: The aim of this research work is to demonstrate that the business intelligence based tools are capable to enhance the CRM successful implementation. **Methods/Statistical Analysis:** To gather preliminary data the authors used questionnaire. The first questionnaire evaluates variables influencing the successful implementation of CRM using business intelligence. The second questionnaire also examines various aspects of customer orientation as the output deals with the use of Customer Relationship Management. To test the conceptual model and hypotheses, the PLS technique is deployed. It is a component-based estimation approach that differs from the covariance-based structural equation modeling. **Findings:** Hypothesis test showed that the test statistics in all three main hypotheses and other underlying assumptions is greater than the critical value of t at the level of 5% (1/96), i.e., the observed correlation between model relationship is significant. As a result, all three information technology, knowledge management and organizational fields based on business intelligence, have a direct and positive impact on successful Customer Relationship Management implementation. For the future works it's recommended to develop the presented conceptual model of this work in a more complex organization in terms of uncertainty and using fuzzy data. **Application/Improvement:** According to the results, data integration to CRM success is of special importance, therefore managers should deploy required standards for integrating existing data and processes in the organization.

Keywords: Business Intelligence, CRM, Customer Orientation, Knowledge Management, Partial Least Squares

1. Introduction

Commercial organizations consistently pay huge expenses incurred by their marketing activities and management of customer relations. With effective marketing activities, organizations achieve their goals, and these activities enjoy efficacy when performed at optimal cost. Traditional marketing models, including identical and mass activities to target large numbers of customers, and spending massive amounts on advertising and marketing are ineffective in today's competitive

world. Hence, emergence of such concepts as: customer relations management, man to man and customer oriented marketing strategies.

Competitive forces on the one hand, and organization's desire to cut costs on the other, intensify efforts to increase effectiveness and efficacy of marketing actions and customer relations management. Moreover, today, growing information technology in organizations, leads to a tendency toward having strong IT infrastructures like information systems, and is among organizations' strategic challenges. Developmental path

* Author for correspondence

of organizational information systems has advanced to birth of business intelligence systems, so that today, very few organizations are found without at least the most elementary information systems.

The concept of business intelligence was proposed as a result of failing issues associated with information systems management, which provided tools for responding appropriately to organizational information requirements¹. In these circumstances, establishment of customer relations management systems has reached greater maturity, and growth of business intelligence systems has ensured a new path for organizations².

Considering that failure rate of establishing customer relations management is high, organizations ought to seek solutions for setting up successful customer relations management strategies. According to the proposed literature, successful customer relations management output is customer-oriented, which is the common aspect in all studies on business intelligence, and thus establishment of business intelligence is a step in the direction of customer-orientation³. Therefore, in this study, application of business intelligence in success of organization's customer relations management has been evaluated.

In recent years, business intelligence has been identified as an important concept in management and organization, and has turned into a progressive institution in relation to the global markets through providing benefits in all activities and processes. Several studies have been conducted in relation to evaluation of business intelligence, but so far, independent theoretical study about business intelligence and customer relations management has not been conducted. Given the importance and necessity of business intelligence systems for organizations, this study attempts to fill the gap and take a step toward flourishing organizations, and intends to realize the following goals by assessing business intelligence. The principle aim in this study is to evaluate application of business intelligence in success of customer relations management, and pursue the following goals:

- Providing a model in the context of business intelligence for successful customer relations management.
- Identifying business intelligence-based dimensions of successful customer relations management.

In⁴ provided a framework for design business intelligence programs for applications in customer relations management. First, an overall conceptual review of customer relations management and its relationship

with main reference principles (DSS, KM, and SE) is conducted. This model describes design of business intelligence systems for customer relations management using questionnaire from two review studies.

In⁵ explored homogenization and analysis of customer relations management data and registration of call details by telecom operators using a service approach in order to help the organization to accurately decide and determine the actual time for designing tariffs to ensure customer satisfaction that could result in benefits instead.

According to⁶ data pool, together with online analytical tools, can provide such achievements as customer request and retaining customers, and increased sales, with maximizing customer satisfaction as the main objective, as considered in this article.

According to⁷ a model was proposed for use of information technology for success in online businesses and shops. Case studies of success and failures of customer relations and business intelligence were presented, and strategies, successes and failures were identified in the Finger-hoot Company, which showed business intelligence-based businesses can lead to development of customer relations management and can play a key role in achieving and maintaining competitive edge.

It has been shown that the technological dimension of the CRM in the context of customer value (functional value, social value, emotional value and customer perceived sacrifices) is influential on customer satisfaction⁸. In⁹ it has been recommended that NANO companies must empower their information technology capacity to have better chance to be the winner of the competitive world. In their study a CSF (Critical Success Factor) framework has been developed which is crucial for BI systems implementation and the framework has been delineated through a series of NANO organization. CRM process in hotel industry has been studied in¹⁰ and shown that how CRM can be strategy tactics for solution as business attitudes towards the hotels via nine different items in the hotel diligence connecting to Measure, Acquisition, Tegan, Maintain, Retain, Cross up, Refferals, Termination Measure and Exit.

2. Method

This study aimed to examine impact of implementation of business intelligence on customer relations management. Since the present study was conducted with the aim

to make use of existing knowledge to demonstrate a structural relationship, and to help managers of the organization under study in decision making about a specific area, it is considered an applied study in terms of objectives. In relation to data collection method, both library and field (using a questionnaire) study methods were used. Therefore, it can also be regarded a descriptive survey study. The main question is whether use of business intelligence can provide a solution to increase customer relations management success, and reduce its implementation rates". To answer this question, the researcher proposed some hypotheses (shown below) using the following model. According to¹¹ model and its modified version¹², the main factors in customer relations management success include: Customer-orientation, knowledge management, information technology, and organizational support. Technology, knowledge management, and organizational support comprise inputs for successful CRM, with customer-orientation as the result, and CRM output for evaluating its success.

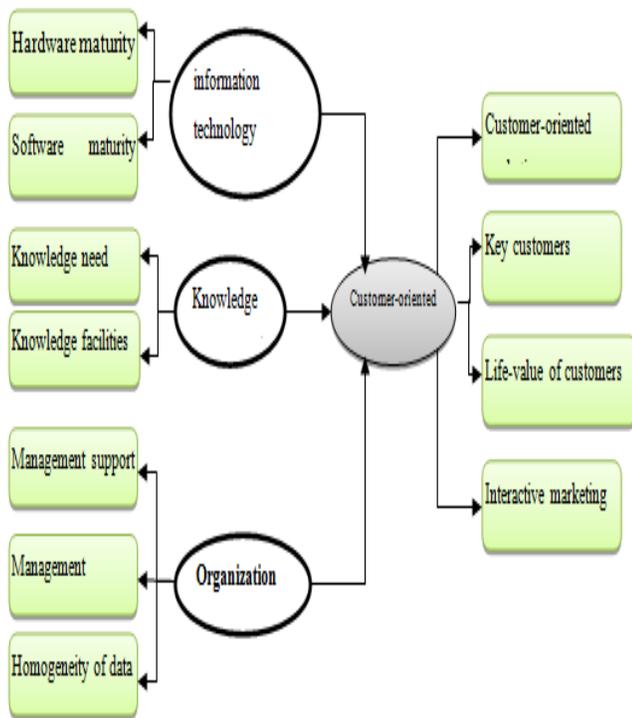


Figure 1. Developed model of customer relations management success in the context of business intelligence.

According to proposed objectives, in this study, three hypotheses are put forward:

- Business intelligence-based information technology

affects success of customer relations management.

- Business intelligence-based knowledge management affects success of customer relations management.
- Business intelligence-based organizational contexts affect success of customer relations management.

And secondary hypotheses include:

- Business intelligence-based knowledge requirement affects success of customer relations management.
- Business intelligence-based knowledge facilities affect success of customer relations management.
- Business intelligence-based top-management support affects success of customer relations management.
- Business intelligence-based organizational managers' knowledge affects success of customer relations management.
- Business intelligence-based homogeneity of organizational data affect success of customer relations management.
- Business intelligence-based hardware maturity affects success of customer relations management.
- Business intelligence-based software maturity affects success of customer relations management.

In this study, statistical population consisted of scientific-research database managers and experts of Pars Modir. Snow-ball technique was used for sampling. Accordingly, 30 managers and experts were selected. In this study, library and field study methods were used for data collection. Library resources were used for collection of data related to theoretical basis and literature on study topic, and data were collected through a questionnaire.

In this study, two questionnaires were used for collection of primary data. The first questionnaire related to assessment of influential variables on success of application of customer relations management using business intelligence. The second questionnaire was concerned with examining different dimensions of customer-orientation as application of customer relations management output.

Therefore, independent variables of success of customer relations management in the context of business intelligence include: Knowledge management and organizational support, and also dependent variables of success of customer relations management (output) include customer-orientation: Customer-oriented marketing, life value of customer, customizing, and interactive marketing (long-term customer relationship).

In this study, content validity method was used to examine validity of questionnaire, which was issued to a number of experts, and advising and consulting

professors and their views on questions and hypotheses were sought, and consensus was reached about validity of questionnaire. Cronbach's alpha coefficient was calculated at 0.828, indicating favorable reliability. Cronbach's alpha was also calculated for each of the study constructs.

To examine and describe general characteristics of respondents, descriptive statistical methods such as mean and frequency distribution tables were used. Analysis of data obtained was carried out using Excel, SPSS, and Smart PLS software. To examine conceptual model of study, PLS technique, which is a path modeling method based on variance analysis, was used.

3. Data and Analysis

Sixteen respondents (60%) were male, and eleven (40.74%) were female. Six respondents had university degrees (22%). Most participants, 16 people (60%), had Master's, 5 had PhD or were PhD students.

To examine the model, first an external model was used to investigate the relationship between latent variables and their assessing items. The external model examines the relationship between items or questions in questionnaire and constructs. In fact, relationships cannot be assessed until it can be demonstrated that questionnaire items do measure latent variables. An external model was used to show latent variables have correctly been measured. According to results of measuring model, factor loading was greater than 0.2 in every case, which indicates a suitable correlation between observed variables and their own latent variables. Therefore, it can be concluded that every main variable has correctly been assessed, and given results obtained from this scale, study hypotheses can be tested.

The relationship between variables in each hypothesis was tested according to a causative structure using Partial Least Squares (PLS) technique. The distinctive study model was tested and presented according to the relationship between each variable. In the general study model, mean response to observed variables of each latent variable was calculated, and ultimately, each latent variable was used as an observed variable in its main construct. T-test was used to assess the significance of relationships. Standard factor-loading in assessment of each construct was found by relevant variable greater than 0.6, and t was calculated greater than 1.96. Thus, based on the external model results, the general model output results are reliable.

In this study, the first hypothesis was "information technology based on business intelligence affects success of customer relations management". To examine information technology construct based on business intelligence, the two latent variables of hardware maturity and software maturity were used. To examine construct of success of customer relations management, four latent variables of customer life-value, customer-oriented marketing, customizing, and long-term customer relationship were used. Power of the relationship between information technology based on business intelligence and CRM success was calculated at 0.223, which is a moderate to low value. Test statistic was found 3.052, which is greater than the critical value of t at 0.05% error that is 1.96, and shows a significant observed correlation. Hence, information technology based on business intelligence has a direct and positive effect on CRM success in Pars Modir.

The second hypothesis was "knowledge management based on business intelligence affects success of customer relations management". To assess this construct, the two latent variables of need for knowledge, and knowledge facilities were used. To examine construct of success of customer relations management, four latent variables of customer life-value, customer-oriented marketing, customizing, and long-term customer relationship were used. Power of the relationship between knowledge management based on business intelligence and CRM success was calculated at 0.312, which is an acceptable value. Test statistic was found 3.986, which is greater than the critical value of t at 0.05% error that is 1.96, and shows a significant observed correlation. Hence, knowledge management based on business intelligence has a direct and positive effect on CRM success in Pars Modir.

The third hypothesis was "organizational contexts based on business intelligence affects success of customer relations management". To assess this construct, the three latent variables of top management support, and organizational managers' knowledge, and homogeneity of organizational data were used. To examine construct of success of customer relations management, four latent variables of customer life-value, customer-oriented marketing, customizing, and long-term customer relationship were used. Power of the relationship between organizational contexts based on business intelligence and CRM success was calculated at 0.516, which is considered an acceptable value. Test statistic was found 10.736, which is greater than the critical value of t at 0.05% error that is

1.96, and shows a significant observed correlation. Hence, knowledge management based on business intelligence has a direct and positive effect on CRM success in Pars Modir.

In this study, the effects of three variables of information technology, knowledge management, and organizational contexts based on business intelligence on CRM success

in Pars Modir base were assessed to investigate secondary hypotheses. Using partial least squares technique, taking into account concurrent effects of other variables, effect of each of these variables associated with these constructs was separately examined in the form of a general model.

Table 1.

	Customer life-value		Customer-oriented marketing		Distinguishing key customers		Long-term customer relationship	
	t-value	Factor loading value	t-value	Factor loading value	t-value	Factor loading value	t-value	Factor loading value
Need for knowledge	0.909<1.96	0.117<0.2	0.502<1.96	-0.057<0.2	1.268<1.96	0.233>0.2	0.301<1.96	0.031<0.2
	Low correlation		Poor correlation		Moderate correlation		Low correlation	
	Need for knowledge based on business intelligence has a low on success of customer relations management							
Knowledge facilities	2.344>1.96	0.380>0.2	2.972<1.96	0.391<0.2	0.098<1.96	-0.027<0.2	1.235<1.96	0.164<0.2
	High correlation		High correlation		Poor correlation		Low correlation	
	Knowledge facilities based on business intelligence has a positive and direct effect on success of customer relations management							
Top management support	0.23<1.96	-0.032<0.2	0.213<1.96	0.035<0.2	0.790<1.96	-0.153<0.2	1.383<1.96	0.259>0.2
	Poor correlation		Low correlation		Poor correlation		Moderate correlation	
	Top management support based on business intelligence has no direct effect on success of customer relations management							
Organizational managers knowledge	1.175<1.96	0.124<0.2	1.010<1.96	-0.128<0.2	3.168>1.96	0.376>0.2	2.518>1.96	0.425>0.2
	Low correlation		Low correlation		High correlation		High correlation	
	Managers knowledge based on business intelligence has relatively direct effect on success of customer relations management							
Homogeneity of data in organization	0.722<1.96	0.091<0.2	0.940<1.96	0.190<0.20	1.264<1.96	0.370>0.2	2.092>1.96	0.195<0.2
	Low correlation		Relatively low correlation		Moderate correlation		Moderate correlation	
	Homogeneity of data based on business intelligence has a relatively moderate effect on success of customer relations management							
Hardware maturity	3.861>1.96	0.483>0.2	2.361>1.96	0.325>0.2	0.334<1.96	0.053<0.2	1.112<1.96	0.126<0.2
	High correlation		High correlation		Low correlation		Low correlation	
	Hardware maturity based on business intelligence has a moderate effect on success of customer relations management							
Software maturity	0.908<1.96	-0.119<0.2	1.795<1.96	0.277<0.2	0.353<1.96	0.053<0.2	1.424<1.96	-0.148<0.2
	Low correlation		Moderate correlation		Low correlation		Low correlation	
	Software maturity based on business intelligence has a low to moderate effect on success of customer relations management							

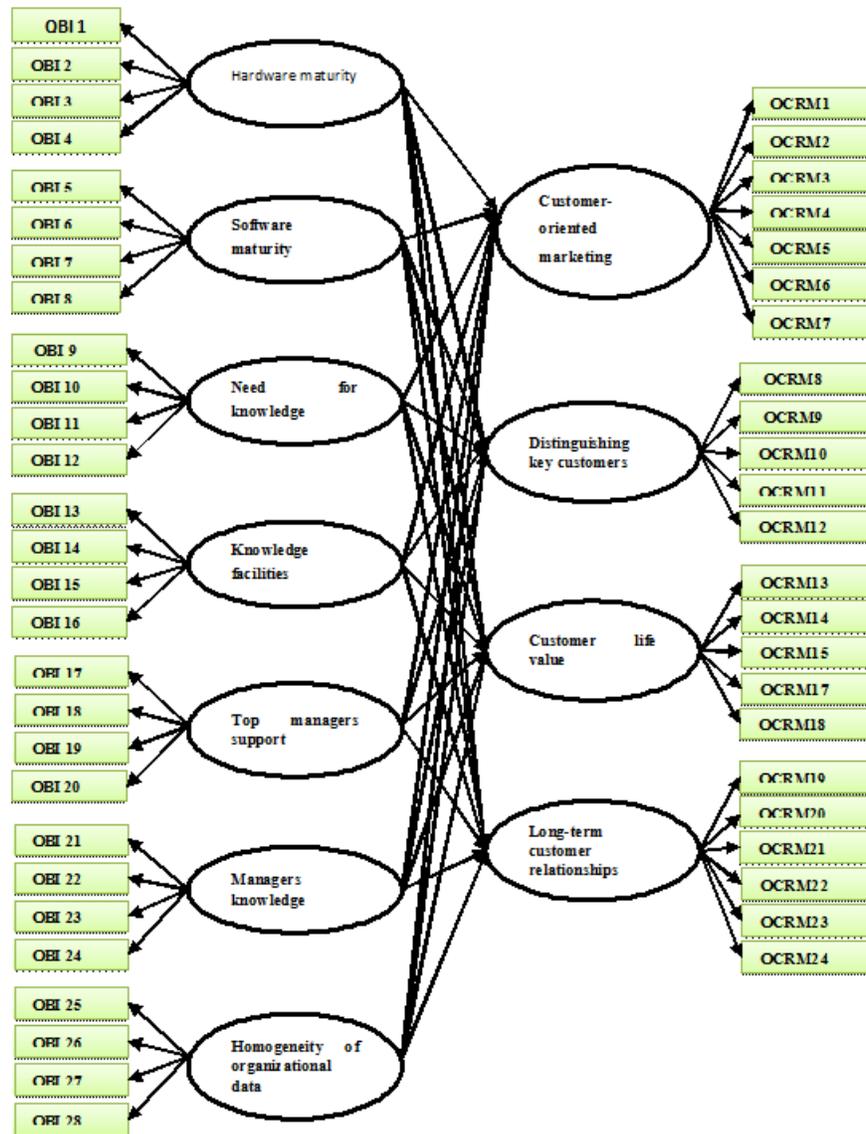


Figure 2.

4. Discussion and Conclusion

All three main hypotheses were confirmed. Given the study background, since information technology, knowledge management, and organizational contexts based on business intelligence, were identified as three independent variables in success of customer relations management, conclusion can be drawn that business intelligence has a direct and positive effect on success of CRM, and implementation of business intelligence in organizations is necessary requirement for their ever-more success and tendency toward customer-orientation. Through examining distinct models, more delicate results were obtained, and the effect of individual secondary hypothesis on CRM success was also shown. In this section, we used PLS technique to examine the effect of

each variable associated with main constructs, accounting for concurrent effects of other variables, as a general model, and standard factor loading of relationships between study variables and their significant values were separately calculated. Given the values obtained, conclusion was drawn that organizational support was particularly important, knowledge management came next, and information technology last.

In brief, the correlation between latent variable of need for knowledge based on business intelligence toward CRM success is only somewhat effective on distinguishing key customers. Examining latent variable of knowledge facilities based on business intelligence showed a significant correlation with customer life-value

and customer-oriented marketing, and enjoyed low significance in terms of distinguishing key customers and long-term customer relationship. Therefore, the effect of knowledge facilities based on business intelligence on distinguishing key customers and long-term customer relationship should be taken into account as an effective variable in CRM success. Also, the correlation of latent variable of top management support based on business intelligence is somewhat effective on long-term customer relationship in CRM success. Latent variable of organizational managers' knowledge based on business intelligence showed low to moderate correlation with customer life-value, and low significance with customer-oriented marketing, but a significant correlation with distinguishing key customers and long-term customer relationship. As a result, organizational managers' knowledge based on business intelligence has a relatively direct effect on CRM success. Homogeneity of organizational data based on business intelligence enjoy low significant correlation with customer life-value, moderate significance with customer-oriented marketing, and a significant correlation with distinguishing key customers and long-term customer relationships. Therefore, homogeneity of data based on business intelligence has a direct effect on CRM success, and managers should pay particular attention to this variable.

Finally, information technology variables were investigated. Latent variable of hardware maturity based on business intelligence has a significant effect only on customers' life-value and customer-oriented marketing. Thus, the effect of hardware maturity based on business intelligence on customer's life-value and long-term relationships should be taken into account. Lastly, variable of software maturity based on business intelligence showed a low to moderate significant effect only on customer-oriented marketing. Therefore, its effect on customer oriented marketing should be considered.

According to field study findings, several recommendations are made to the research/science base of Pars Modir.

Since knowledge need based on business intelligence is somewhat effective on distinguishing customers, Pars Modir managers should implement necessary information transparency infra-structures toward further customization of products. Accordingly, products should be ordered in accordance with current and future needs of customers. Knowledge facilities based on business

intelligence was one of the influential factors in CRM success. Consequently, Pars Modir managers should take a leap toward increasing use of organizational processes that would lead to production of large volumes of data, to enable information circulation within Pars Modir, and increase awareness and knowledge of organizational managers and experts. At Pars Modir, the effect of hardware maturity based on business intelligence on customer life-value and customer-oriented marketing must be taken into account. Through creating appropriate hardware maturity infra-structures, organization will be able to establish and implement useful software and programs for customers.

Researchers interested in this area are recommended to develop a conceptual model of the present study in a large organization and in uncertain environment, and investigate the effects of implementation of business intelligence systems on reducing hidden customer costs (such as: risk and opportunity costs), or identify and prioritize dimensions of CRM success based on business intelligence using multi-criteria decision-making techniques such as TOPSIS, VICOR, or combined approaches to multi-criteria decision-making, and ultimately, identify key and beneficial customers of the organization using business intelligence tools.

One of the study limitations was the small sample size. We had to choose this small company because most managers are not familiar with business intelligence, but Pars Modir managers were somewhat familiar with the concept of business intelligence and how it should be used. Secondly, due to small sample size, and similar age range of staff, data were grouped in terms of gender and education frequency.

5. References

1. Saifi F. Electronic preparedness of marketing information systems of small food industry companies. School of Management, University of Tehran; 2010.
2. Lee CKM, Lau HCW, Hob GTS, Ho W. Design and development of agent-based procurement system to enhance business intelligence. *Expert Systems with Applications*. 2009; 36(1):877–84.
3. Lin YH, Tsai KM, Shiang WJ, Kuo TC, Tsai CH. Research on using ANP to establish a performance assessment model for business intelligence systems. *Expert Systems with Applications*. 2009; 36(2):4135–46.
4. Gharaibeh NK, Fobrig P. A new framework for the development of CRM business intelligence applications. *Economics*

- and strategic management of business process. International Conference on Control, Engineering and Information Technology; 2013. p. 26–9.
5. Ishaya T, Folarin M. A service oriented approach to business intelligence in telecoms industry. *Telematics and Informatics*. 2012; 29(3):273–85.
 6. Khan A, Ehsan N, Mirza E, Sarwar SZ. Integration between Customer Relationship Management (CRM) and data warehousing. *Procedia Technology*. 2012. p. 239–49.
 7. Dien DP, Douglas RV. A model of customer relationship management and business intelligence systems for catalogue and online retailers. *Information and Management*. 2010; 47:69–77.
 8. Hashemzadeh GR, Khaksar SMS, Nawaser K, Jahanshahi AA. Technological dimension of customer relationship management. *Indian Journal of Science and Technology*. 2011; 4(11):1565–72.
 9. Hasan HM, Lotfollah F, Negar M. Comprehensive model of business intelligence: A case study of Nano's companies. *Indian Journal of Science and Technology*. 2012; 5(6):2851–9.
 10. Leena NE, Jaykumar V, Issac SS. Assessing CRM practices in hotel industry: A look at the progress and prospects. *Indian Journal of Science and Technology*. 2015; 8(6):82–90.
 11. Sin LY, Tse AC, Yim FH. CRM: Conceptualization and scale development. *European Journal of Marketing*. 2005; 39(11/12):1264–90.
 12. Garrido-Moreno A, Padilla-Melendez A. Analyzing the impact of knowledge management on CRM success: The mediating effects of organizational factors. *International Journal of Information Management*. 2011; 31(5):437–44.