ELECTRONIC CUSTOMER RELATIONSHIP MANAGEMENT (e-CRM) AND DATA INTEGRATION

1 Overview

Good relationship between a customer and an organization creates higher customer satisfaction. Almost all business focus on enhancing this relationship because customers are the ones who keep the business running (Jayanthi & Vishal, 2009) [1]. CRM systems are capable of increasing the satisfaction of customers and creating the competitive advantage that organizations need to attract customers (Nguyen et.al., 2007; Dean et.al., 2008) [2-3]. As businesses are looking for better ways to communicate and interact with customers nowadays, many of them choose e-CRM (electronic Customer Relationship Management). Since the competition among businesses is getting higher, many businesses concern to develop products and services to match customer needs. e-CRM allows a business to understand customer behaviour and forecast customer needs through online activities and able to improve long-run profitability, this it becomes more popular (Christopher et.al., 1991 cited in Aileen, 2006) [4].

According to Dotan (2008) [5] e-CRM can improve the levels of interaction between customer and service. The common goal of using e-CRM is to improve customer relationship via improving customer service and retaining profitable customers. In addition, e-CRM is able to create loyalty and extent customer life cycle by increasing customer value and satisfaction (AvJill, 2001; Ravi and Macia, 2001) [6-7].

The customer relationship that e-CRM created can help organization maintain their profitable customers and also create loyalty among customers. The factors that are important in e-CRM processes are divided in three main categories which are strategy, technology and people. Because the purchase behaviour is based on the satisfaction of customer needs, hence the marketing manager should be able to communicate and show how their products and services can satisfy the needs of their target customers (Stanton et.al., 1994; Eric & Jerry, 2001) [8-9]. Technical institutions in India like to have a close contact with the stakeholders such as Students, Administrators, Faculty Members, Donors, Institution and Alumni for their

sustainability in the global market to attract and retain the valuable customers they are attracted towards e-CRM solutions so that they can reach the highest customer satisfaction. This strategy help the institutions to attract, retain and get the maximum profit from the existing customers so that they can sustain in the competitive market.

CRM Background

Customer Relationship Management (CRM) is an integration of business processes and technologies which is used to satisfy customers needs (Ranjit, 2002; Dotan 2008; Jayanthi & Vishal, 2009) [10, 5, 1]. It is processes that collects customers' information and applies those data in marketing activities (Ron, 2001) [11]. The Internet capabilities and software can help organizations manage relationship with their customers through CRM (Xu et.al., 2002 cited in Dotan, 2008) [39, 5]. The CRM becomes an important factor in business strategies, processes, and information technologies which enable organizations to maximize profits and increase customers' satisfaction and needs. Its process permits organizations to analyze customer data rapidly while improving customer loyalty via their products (courses) and services (Liu, 2007; Darrell et.al., 2002) [12-13].

Electronic Customer Relationship Management (e-CRM) Background

Electronic Customer Relationship Management (e-CRM) is referred to the marketing activities, tools and techniques via the Internet network which are able to build and enhance relationship between organization and customers (Lee-Kelley et.al., 2003 p.241) [14]. Bradway and Purchia (2000) [15] mentioned that e-CRM is the intersection between Internet market and customer-centric strategies. It is sometime referred to web-enabled or web-based CRM (Aileen, 2006) [4]. Since the use of IT plays the important role to deliver products and services to customer (customer does not use CRM), business decides to use e-CRM to support the multiple electronic channels to contact and communicate with its customers (Bernett & Kuhn, 2002) [16]. Same as CRM, e-CRM objective is to gather information from customers and adjust service level to match with specific needs which will able to enhance customer relationship (Jerry & Nicholas, 2006, p.23) [17]. e-CRM helps organization to enable specific products and services to reach customer needs through Internet access (/Schneider, 2004; Hugh et.al., 2002) [18-19]. This is one of the opportunities that organizations received because it can retain profitable and valuable customers by

fulfilling their requirements (Ing-long & Ching-Yi, 2009) [20]. Customer satisfaction, customer retention and customer loyalty are three significant components of customer relationship that organization wants to achieve significant goals of CRM (AvJill,2001; Mohamad & Ning, 2005) [6, 21]. The first paradigm shift from old economy to new economy primarily addressed the mechanics of business operations and supporting technologies. The second paradigm shift and the one that many businesses fail to make is to address the relationship between businesses and the customers they serve; that is the shift from customer relationship to the new paradigm e-CRM. In today's competitive arena the market dynamics which institutions must address in order to survive and prosper are a) newly empowered customers who choose how to communicate with the institutions, b) consumers who expect a high degree of personalization, c) emerging real time, interactive channels including email, web, ATMs and call centre that must be synchronized with a customer's non-electronic activity. The speed of business change requires flexibility and rapid adoption to technologies. The `e' in e-CRM not only stands for 'electronic' but also can be perceived to have many other connotations. Though the core of e-CRM remains to be across channel integration and optimisation, the six 'e' in e-CRM can be used to frame alternative definitions of e-CRM based upon the channels which e-CRM utilizes, the issues which it impacts and other factors.

Electronic Channels: New electronic channels such as the web and personalised e-messaging have become the medium for fast, interactive and economic communication, challenging companies to keep pace with this increased velocity, e-CRM thrives on these electronic channels.

Enterprise: Through e-CRM a company gains the means to touch and shape a customer's experience through sales, services and corner offices-whose occupants need to understand and assess customer behaviour.

Empowerment: e-CRM strategies must be structured to accommodate consumers who now have the power to decide when and how to communicate with the organization/institution. Through, which channel, at what frequency? An e-CRM solution must be structured to deliver timely pertinent, valuable information that a consumer accepts in exchange for customer attention.

Economics: An e-CRM strategy ideally should concentrate on customer economics, which drives smart asset-allocation decisions, directing efforts at individuals likely to provide the greatest return on customer-communication initiatives.

Evaluation: Understanding customer economics relies on a organization ability to attribute customer behaviour to market programs, evaluate customer interactions along various customer touch point channel, and compare anticipated ROI against actual returns through customer analytic reporting.

External Information: The e-CRM solution should be able to gain and leverage information from such sources as third party information networks and web page profiler application.

The e-CRM must address the stakeholders optimization along three dimensions i.e. acquisition, expansion and retention. An e-CRM solution should also establish a central mechanism to determine which customer should receive what information with type relationship level.

1.1. e-CRM Architecture

The primary inputs to this module are mainly from the e-CRM Assessment and strategy alignment modules. During this stage the institution will try to develop a Connected Enterprise Architecture (CEA) within the context of the institution's own Customer Relationship Management Strategy. The following set of technical e-CRM capabilities and applications that collectively and ideally comprise a full e-CRM solution. They are:

- Customer Analytic Software.
- Data mining software
- Campaign Management Software.
- Business Simulation software.
- Real time decision engine.

Customer analytic software predicts measures and interprets customer behaviours, allowing organizations to understand the effectiveness of e-CRM efforts across both inbound outbound channels. Most importantly, customer analytic should integrate

with customer-communications software to enable organizations to transform customer findings into ROI-producing initiatives.

Data mining software builds predictive models to identify customers most likely to perform a particular behaviour such as purchase an upgrade or churn from the company. Modelling must be tightly integrated with campaign management software to keep pace with multiple campaigns running daily or weekly.

Campaign management software leverages the data warehouse to plan and execute multiple, highly targeted campaigns overtime, using triggers that respond timed events and customer behaviour. Campaign management software tests various offers against control groups, capture promotion history for each customer and prospect, and produces output for virtually any on-line or off-line customer touch point channel.

Business simulation used in conjunction with campaign management software optimises offer; messaging and channel delivery prior to the execution of campaigns, and compares planned costs and ROI projections with actual results.

A Real time decision engine co-ordinates and synchronizes communications across disparate customer touch point systems. It contains business intelligence to determine and communicate the most appropriate message, offer, and channel delivery in real time, and support two-way dialogue with the customer.

Regardless of the type of the business a company is into, the organizations following the basic e-CRM tenets cross channel co-ordination, warehouse-centric customer profiling, personalization, permission marketing and consistent and continuous measurement and assessment can achieve considerably higher response rates and ROI on marketing programs. These organizations will have far easier time attracting, retaining and expanding profitable relationship with the customer.

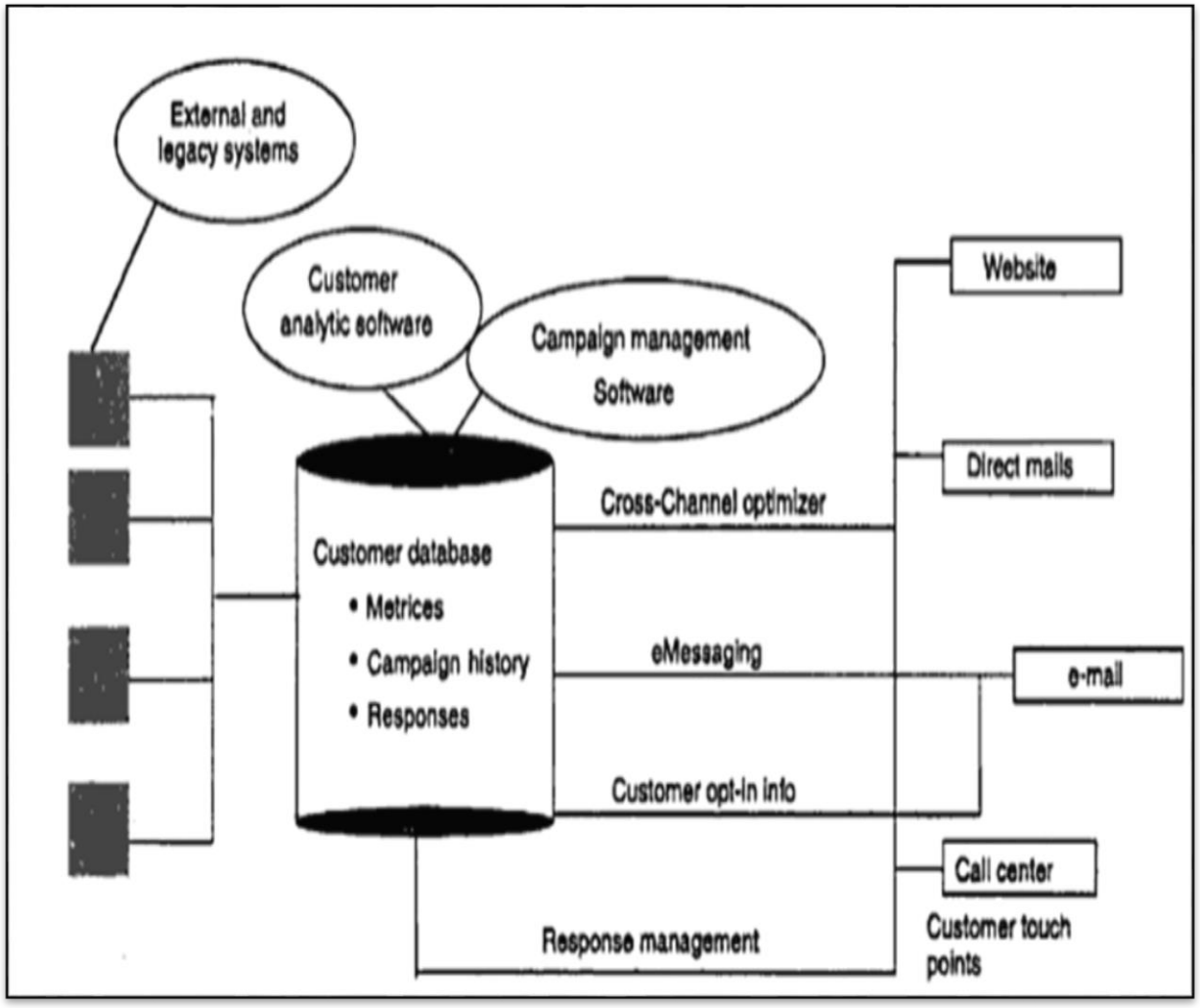

Fig.1. Basic Components and Architecture of an e-CRM solution

1.2. e-CRM Components

The components of e-CRM and the purpose of these components in the functioning of the business are shown in Table 1 with emphasis on the enabling technology to support e-commerce, e-marketing, e-shipping and e-care.

Table 1 : Components of e-CRM

<table>
<tr><th>Components</th><th>Purpose</th><th colspan="4">What does it do</th></tr>
<tr><td>Presentation Layer</td><td>Customer facing web site</td><td colspan="4">Look and feel, site navigation, wireframes</td></tr>
<tr><td rowspan="2">Tools and Applications</td><td rowspan="2">Enabling technology to support eMarketing, eShopiing, eCommerce and eCare</td><td>e-Marketing</td><td>e-Shopping</td><td>e-Commerce</td><td>E-Care</td></tr>
<tr><td>Web content personalization merchandizing catalog admin</td><td>Product configurator shopping cart customization</td><td>Order Mgmt, Authorization payment processing tax calculation billing</td><td>Collaboration co-browsing , Chat, Email, FAQ</td></tr>
<tr><td>Business rules</td><td>Business automation</td><td colspan="4">Documenting business rules for automation</td></tr>
<tr><td>Measurement Analysis and Reporting</td><td>Continuous monitoring and improvement</td><td colspan="4">Measurements and reporting tools, metrics, analytics, database, reporting database.</td></tr>
<tr><td>Real-time information data</td><td>Capture, storage and dynamic access to real-time information.</td><td colspan="4">Product, catalog, pricing, financial systems, OLTP (Real-time)</td></tr>
<tr><td>Backend data information</td><td>Integration with backend with legacy system</td><td colspan="4">Inventory, operational DB, accounting, supply chain, supply financial chain.</td></tr>
</table>

There are five e-CRM components they are:

- The Customer Centric Information Store.
- The Analysis and Segmentation Engine
- The Personalization Engine
- The Broadcast Engine
- The Transaction Engine

These above five components together provide the platform for an e-CRM business process. Without these five engines, e-CRM is not a scalable, defensible business proposal practice for an organization.

The Customer Centric Store – A Unified View of Every Customer – e-CRM initiatives depend on a 360-degree customer view. A customer centric information store integrates data from disparate information sources such as web sites, transactional system and operational databases, call centres, enterprise resource planning systems and third party data. This engine enables organization to recognize and respond accurately to customers. Such an information store should be scalable, flexible and give high performance. This information store decreases customer attrition rates and improves retention. This forms the inventory of customer trust and loyalty, becoming a valuable corporate asset and giving an enterprise, a source of competitive advantage.

The Analysis and Segmentation Engine – Building trusted customer relationships depend on accurate customer segmentation. This engine performs business analysis, segmentation and prediction so that customer interactions take place in an appropriate and personalized manner. Without this engine e-CRM lacks the intelligence to be effective even if it has massive volumes of customer-centric information.

The Personalization Engine - This makes it possible to personalize products and services for customers in a cost-effective manner, by lowering the marginal cost of personalization. Most organizations provide personalized attention to a small group of clients who are "worth it". Personalization that relies on static information about customer transactions.

The Broadcast Engine – This engine enables 24/7 customer interaction. Successful e-CRM requires an engine that reaches millions of customers wherever they are at home, via phone or TV set-top box, at work – via email, or on the road via WAP phone or pager. A scalable Broad Cast Engine that is built on a open architecture and supports all communication devices enables this level of customer interaction.

The Transaction Engine – Interactions lead to trusted relationships. An effective Transaction Engine promotes information exchange between every customer and the enterprise. This engine maintains customer contact and transmits information to the Customer-Centric Information Store for later use.

1.3. e-CRM Framework

Many studies (Brancheau, Janz & Wetherbe, 1996; Neiderman, Brancheau & Wetherbe, 1991; Brancheau & Wetherbe, 1987; Dickinson, Leithesier, Wetherbe & Nechis, 1984; Ball & Harris, 1982; Martin, 1982) [22 -27] have shown that data has been ranked as one of the top priorities for information services (IS) executives. With the growth of web-based technologies, the collection and storage of data—both internal and external— has increased dramatically. Internal data refers to data generated from systems within an organization, such as legacy and online transactional processing (OLTP) systems. External data refers to data that is not generated by systems within an organization, such as government census data, industry benchmark data, consumer psychographic data and economic data. If this data is collected, integrated and formatted properly, it can prove to be immensely beneficial to a firm in better understanding its customers (Rendlemen, 2001) [28]. External data should be leveraged in a CRM system to the extent that it adds additional value to the existing internal organizational data.

More recent studies have shown favorable CRM outcomes with data integration. Technical issues such as capturing the wrong customer information, using misleading metrics and underestimating the difficulties involved in data mining, data cleansing and data integration are major barriers in implementing and managing successful CRM projects (Jain, Jain & Dhar, 2007; Kale, 2004; Missi, Alshawi & Fitzgerald, 2005) [29 – 31].

Organizations approach consumers through various marketing channels. Traditionally, each channel or functional area has been managed separately, and all data pertaining to a channel is housed in its own system in a proprietary format (Eckerson & Watson, 2001; SAS Institute, 2001) [32–33]. Technically, data integration can be defined as the standardization of data definitions and structures through the use of a common conceptual schema across a collection of data sources (Heimbigner & McLeod, 1985; Litwin, Mark & Roussopoulos, 1990) [34-35]. This implies that data is accessible across functional areas, making data in different corporate databases accessible and consistent (Martin, 1986) [36]. Once these issues are addressed, an organization must present the data in a way that is consistent and

conducive to viewing across heterogeneous enterprise departments (Johnson, 2000) [37].

A recent report from Forrester Research (Ostrow, 2009) [38] forecasts interactive marketing (which includes mobile marketing, social media, email, display advertising and search marketing) to grow over the next five years. Of these online mediums, social media marketing is projected to grow at an annual rate of 34% —from $716 million in 2009 to $3.1 billion by 2014. By then, social media will be a bigger marketing channel than both email and mobile, but only a fraction of the size of search or display advertising ($31.6B and $16.9B, respectively). Consequently, some of this growth comes at the expense of offline advertising. Forrester estimates that online advertising will grow from 12% of total marketing spend in 2009 to 21% by 2014, thereby reducing the amount spent on offline advertising.

More impressive is that by 2014, more than half of total retail sales will be affected by the web—for example, consumers going online to do product research or contact customer service (Engleman, 2010) [39]. In another survey, e-business executives report rising costs of acquiring customers online—current online acquisition costs total half of store acquisition costs, an increase from one-third of the cost reported a year ago. To minimize these marketing costs, organizations should concentrate on satisfying and serving existing customers and understanding the engagement of those customers with their companies (Johnson & Davis, 2009) [40]. These findings suggest that if organizations want to compete in today's marketplace and increase profitability in the coming years, they need to go beyond web cookies and meta-tags—organizations/institutions need to build an integrated offline and online customer profile.

Extensive research and case studies have shown that data integration is one of several critical factors in successful CRM implementations. To realize measurable business value, firms must combine physical resources (such as computers and networks) and informational resources (online and offline customer databases, call records, email correspondence and other customer service interactions) in their CRM systems (Foss, Stone & Ekinci, 2008) [41]. With today's demanding customers communicating through multiple marketing channels, organizations must be cognizant of customer preferences to optimally manage their delicate yet vital relationship with them. The

more data sources a company integrates, the better the customer insight, thus creating more value for the company.

Integrating online data with data from the organizations offline operations will lead to better customer insight, thus creating more value for the organization. Timeliness of data is an important component of user satisfaction (Doll & Torkzadeh, 1988; Ballou, Wang, Pazer & Tayi, 1998; Adams & Song, 1989) [42-44]. Organizations need to have up-to-date information about customers' needs and preferences (Swift, 2002) [45] to thoroughly understand and satisfy customer.

In the book *Web Farming* (1998), Richard Hackathorn [46] advocates that organizations must integrate external data into their data warehouse to gain a complete picture of its business. Sources of external data may include government databases, customer demographic and lifestyle data, online customer preferences, census data, geographic data and weather data. Integrating external data with internal data will lead to better customer insight, thus creating more value for the company.

In many instances, organizations focus their limited resources on their core competencies and outsource many remaining business functions, sometimes retaining the services of application service providers (ASP) and specialized hosting partners to manage online and ecommerce functions (Eckerson & Watson, 2001) [32]. Whether an organization's business processes are performed in-house or outsourced, the collaboration and integration of systems and data from multiple functional areas is complex and difficult. A prior Data Warehousing Institute Industry Report (Eckerson & Watson, 2001) [32] found that organizations are challenged when integrating web technologies into their existing legacy and IT systems. Some of the reasons behind this challenge are scalability issues, managing large click stream databases, immaturity of technology, lack of experience, and the complexity of modeling web data for analysis. But despite the integration challenges, the benefits realized are significant.

For successful CRM analytics, an enterprise-wide, customer-centric data repository should be utilized rather than a channel specific data repository (Beck & Summer, 2001; Swift, 2002; Johnson, 2000) [47, 45, 37]. Vasset (2001) [48] suggests an enterprise-wide, customer-centric data warehouse should be the foundation of any

CRM initiative. The Data Warehousing Institute (TDWI) has defined unified data management (UDM) as a best practice for coordinating diverse data management disciplines and aligning them to business goals. UDM encompasses many disciplines, including data integration, data quality and master data management. A recent TDWI Best Practices Report based on 179 respondents found that the leading two benefits of organizations that practice UDM are better business decisions and better data quality (Russom, 2010) [49]. Deploying an enterprise-wide data warehouse as the CRM backbone will lead to better customer insight, thus creating more value for the company.

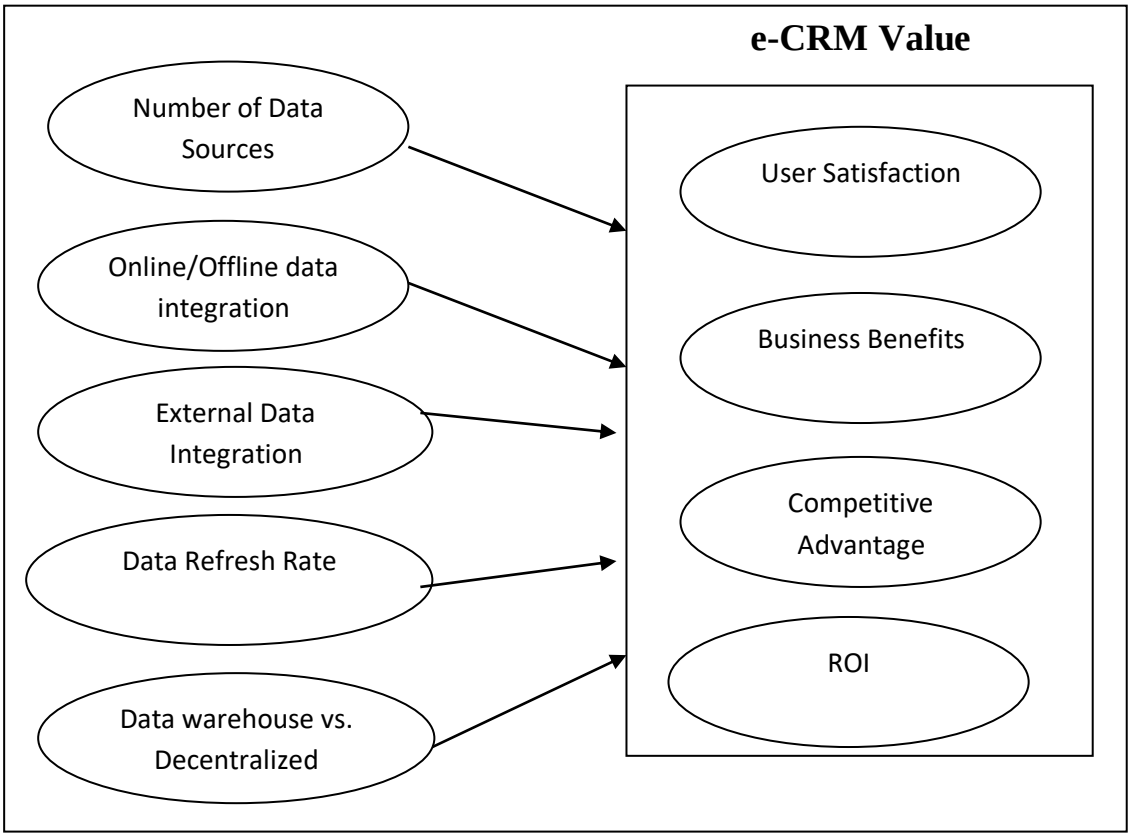

Fig. 2 : e-CRM Value Framework

Research in customer relationship management is growing as it is gaining greater acceptance within organizations. Customer relationship management has received considerable attention from researchers in many diverse disciplines. Given the complexity of the issues involved in data integration, the enormous benefits that electronic customer relationship management can offer, and the role data integration plays in achieving e-CRM's goals.

The data warehouse should contain a healthy number of data sources and house all integrated data including online, offline and external data (Figure 2). With this architecture in place, companies are able to achieve greater profitability by obtaining a better understanding of its customers and its relationships with them. The above e-CRM value framework will help to better examine the significance of integrating data from all customer touch-points with the goal of improving customer relationships and creating additional value for the firm, ultimately leading to a competitive advantage.

1.4. Data Integration using e-CRM

In today's globally competitive market place, organizations of all sizes can no longer ignore the value of business intelligence (BI) technologies and the competitive advantage they offer through optimal, or at the very least enhanced, decision making. These decision support technologies provide business value by discovering analytical insights and incorporating them into organizational processes. This value creation process requires the integration of various technologies and data—a challenging and complex endeavor for even the experts. Although we have a growing arsenal of robust programming APIs along with web-based data standards and universal communication protocols, many technologies remain disjointed. From search engines results and social networks to XML data sources to data warehouses and government databases to software-as-a-service (SaaS) applications hosted in the "cloud" in geographically dispersed data centers, the integration of these technologies to improve decision making is a growing but necessary challenge in creating business value (Kavanagh, 2009) [50].

Yesterday's trends are recurring today as organizations continue to leverage their data resources by developing and deploying data mining technologies to enhance their decision-making capabilities (Eckerson & Watson, 2001) [32]. To address this need, organizations are implementing organizational data mining (ODM) technologies, which are defined as technologies that leverage data mining tools to enhance the decision-making process by transforming data into valuable and actionable knowledge to gain a competitive advantage (Nemati & Barko, 2001) [51]. ODM spans a wide array of technologies, including but not limited to e-business intelligence, data analysis, CRM, predictive analytics, dashboards, web portals, etc.

As a result of these marketplace trends, organizations must begin implementing customer-centric metrics as opposed to solely adopting product-centric metrics (Cutler & Sterne, 2001) [52]. This scenario has triggered increased interest in the implementation and use of customer-oriented ODM technologies such as CRM systems. CRM can be defined as the adoption, through the use of enabling technology, of customer-focused sales, marketing, and service processes (Forsyth, 2001) [53]. Customer relationship management is the process that manages the interaction between a company and its customers. The goal of customer relationship management is to create a long-term, profitable relationship with all of an organization's customers. It is more than just a software package— it is a technology-enabled business process. CRM vendors label these packages as CRM systems because their main goal is to analyze customer behavior and identify actionable patterns. This information is then used to improve goods and services offered to customers while increasing profitability through better relationships. CRM software provides the functionality that enables a firm to make the customer the focal point of all organizational decisions. CRM technologies incorporate some of the best-in-class processes for features such as customer service, product configuration, lead management, database marketing and customer analysis.

Customer relationship management has become a key process in the strengthening of customer loyalty and in helping businesses obtain greater profit from low-value customers. The manner in which companies interact with their customers has changed greatly over the past decade. Customers no longer guarantee their loyal patronage, and this has resulted in organizations attempting to better understand them, predict their future needs, and decrease response times in fulfilling their demands. Customer retention is now widely viewed by organizations as a significant marketing strategy in creating a competitive advantage, and rightly so. Research suggests that as little as a 5% increase in retention can provide a 95% boost in profits, and repeat customers generate over twice as much gross income as new customers (Winer, 2001) [54].

Most organizations/educational institutions now realize and understand the value of collecting customer data but are faced with the challenges of using this knowledge to create intelligent pathways back to the customer. Most data mining technologies and techniques for recognizing patterns within data help businesses sift through the

meaningless data and allow them to anticipate customers' requirements and expectations while more profitably managing channel partnerships and similar relationships. These technologies also enable companies to maintain customer privacy and confidentiality while gaining the benefits of profiling, calculating the economic value of the CRM system, and discovering the key factors that make or break the CRM project. By integrating these data mining tools with CRM software, organizations are able to analyze very large databases to extract new customer insights for stronger and more profitable relationships.

Data mining by itself is not a business solution; it is just an enabling technology. However, by assimilating data mining technology with customer relationship management, organizational data can be transformed into valuable knowledge to enhance business decisions that optimize customer interactions.

Similarly, electronic customer relationship management can be defined as the process of acquiring a thorough understanding of an organization's online visitors and /or customers in order to offer them the right product at the right price. e-CRM analytics is the process of analyzing and reporting online customer/visitor behavior patterns with the objective of acquiring and retaining customers through stronger customer relationships. Prior research has found that in order to understand online customers, a company must integrate its data from both online and offline sources (Mena, 2001) [55]. More recent research (King & Burgess, 2008; Chen & Chen, 2004) [56, 57] has also concluded that system and data integration are critical success factors in e-CRM and CRM initiatives.

In a similar light, our research and analysis also demonstrates that an organization cannot thoroughly understand its customers if it neglects integrating its customers' behavioral data from both online and offline channels. In order to have this complete customer viewpoint, it is imperative that organizations/institutions integrate data from each customer touch-point. Our research elaborates on this key issue of integrating data from different stakeholders of technical institutions for data modeling data warehousing.

2 Business Intelligence and e-CRM

Educational institutions worldwide are undergoing fundamental shifts in how they operate and interact with their "customers":students, alumni, donors, faculty members, and staff members. The focus is currently shifting from improving internal operations to concentrating more on customers. Technical education customers are demanding more attention and immediate service—that is, "Internet time." Proactive institutions are now adjusting their practices by refocusing their efforts externally. Because of the need to concentrate more on customers, many institutions are once again turning to technology—this time to customer relationship management (CRM) software. Similar to ERP, CRM solutions focus on automating and improving processes, although the focus is on front office areas, such as recruiting, marketing, customer service, and support. CRM goes several steps further than ERP by helping institutions maximize their customer-centric resources. Business Intelligence (BI) refers to technologies, tools, and practices for collecting, integrating, analyzing, and presenting large volumes of information to enable better decision making. Today's BI architecture typically consists of a data warehouse (or one or more data marts), which consolidates data from several operational databases, and serves a variety of front-end querying, reporting, and analytic tools. The back-end of the architecture is a data integration pipeline for populating the data warehouse by extracting data from distributed and usually heterogeneous operational sources; cleansing, integrating and transforming the data; and loading it into the data warehouse.

CRM is both a business strategy and a set of discrete software tools and technologies, with the goal of reducing costs, increasing revenue, identifying new opportunities and channels for expansion, and improving customer value, satisfaction, profitability, and retention. CRM software applications embody best practices and employ advanced technologies to help organizations achieve these goals. CRM focuses on automating and improving the institutional processes associated with managing customer relationships in the areas of recruitment, marketing, communication management, service, and support. CRM takes a very customer-centric view of the entire customer life cycle, which means that a CRM business strategy places the customer at the centre of the organization's universe. From the perspective of the customer, a CRM

business strategy allows interaction with the college or university from a single entity that has a complete understanding of their unique status. In the case of a student, this might be seen through the interaction with and between the admissions, registration, financial aid, student accounts, and housing offices. For a faculty or staff member, a CRM business strategy would optimize interaction with departments administering benefits, payroll, staff training, information technology (IT), or facilities. From the perspective of the college or university, the CRM business strategy provides a clear and complete picture of each individual and all the activities pertaining to the individual.

The customers should be contacted either with the help of web-site, e-mail, phone, fax or other media to get the information about the technical institutions. If the customers do not respond with the above are contacted with follow-up e-mails.

The following customers/stakeholders are contacted with either one of the above media's and the data was collected. The individual data marts are maintained pertaining to Students, Administrators, Faculty Members, Advancement and the institution. Finally the data marts are integrated together to create final technical institutions database.

Most important is the ability of a truly robust set of institutional processes and tools to bring the entire institution together around its people. The work of technical education should be focused on the people it serves, not on its administrative systems.

The discipline of business intelligence addresses a broad range of functional activities from data mining and statistical analysis to predictive modeling and reporting. Within the context of CRM, business intelligence is the process of leveraging detailed customer-behavior information to best manage relationships for maximum customer satisfaction, loyalty, retention and profitability.

The foundation of a CRM strategy is the capture and leveraging of the right information to enhance your customer relationships. Relationships by their very nature are a reflection of human interaction or behaviors. Information comes in

different forms that require different tools and methods for effective collection, analysis and dissemination.

Similarly, business intelligence requires the right tools - data mining, decision support and analytical technologies - to collect and analyze the right information about customer behaviors. The process of BI involves using these tools and information resources to understand related behaviors and outcomes so you can make the necessary changes to your business to achieve the desired results.

There are three fundamentally different types of CRM information resources - content data, contextual data and analytical data - and each requires different tools and methods for the appropriate management and use within your CRM strategy. It is the effective integration of information across these resources that will drive your CRM strategy development and related business intelligence processes. As a result, it is important to understand the fundamental differences in information resources and their roles within an overall CRM strategy. (Table 2).

Table 2: Business Intelligence for CRM

Content	Context	Analysis
Action	Nuance	Meaning
Event-oriented	Conditions	Trends and Comparisons
Who, What, When, Where	Environment	Impact
Capture	Relationship	Predictability

Content Data

The content data consists of all information captured about individual events and customer encounters. Content information essentially records the details, or facts, of customer encounters - who, what, when and where. This fact-based information reflects an activity that has occurred. The content-oriented information includes direct sales encounters, customer calls to the contact center and Web service interaction.

Contextual Data

Contextual data refers to the *conditions* under which an individual event or customer encounter occurs. Contextual information enhances the knowledge of basic encounter content data by providing a more comprehensive view of the conditions of an encounter.

In addition to a customer encounter (or fact), contextual data includes a broader representation of information that might have influenced the customer's behavior during the encounter. One thing to remember is the contextual information often changes over time. Thus, it is important to maintain records of customer contextual information that reflect both the current context, such as a customer address or buying propensity, as well as the historical context, such as prior demographics. This combination of current and historical data enables effective analysis of customer relationships and trends over time.

Contextual information involves leveraging such internal and third-party information as customer demographics, related marketing and event campaign details, and customer historical behaviors such as buying trends and customer service interactions.

The effective integration of information content and context drives analytic applications, which evaluate the relationship of encounters under various contextual circumstances to identify predictable trends in customer behaviors. The resulting information analysis can then be incorporated into your business intelligence process.

Analytical data includes customer-buying propensity by geography and other demographics, customer service preferences by channel and customer type, and customer profitability by longevity and other demographic categories.

3 Conclusion

There are many ways that institutions offering technical education can improve their e-CRM to enhance the customer relationship. Firstly, institutions should understand what the key factors are, their significance and characteristics. Secondly, they must understand the relationship and relevancy of those key factors. Implementation of e-CRM is very important in the early stage because its outcome has a great impact on e-

CRM operation. e-CRM supports the collection of customer information and the process with customers through internet so the core technologies of e-CRM will be network and IT facilities. Institutions should provide an efficient network and IT facilities sufficient for the usage of employees and able to support the use of e-CRM. In this fast growing society, e-CRM technologies must be one of priorities the organizations should consider. This is because e-CRM is the system that runs 24x7 operations and if it falls, it can cost some loss to organization. To maintain e-CRM and improve customer relationship continuously, organizations must run and operate the network and customer databases smoothly.

Customer data integration (CDI) is rapidly becoming a strategic initiative for technical institutions who want to successfully target, acquire, develop and retain customers. However, in order to benefit from CDI, an organization needs to create a unified and comprehensive customer view from all disparate data sources including CRM, financial, product and external data services. Once integrated, these unified customer view provide the entire organization with the ability to drive meaningful business action within and across operations systems. While building and managing a unified customer view across disparate data source, applications and channels have often proved to be a complex and costly exercise. A neutral, metadata driven, rules-based approach to building a open customer hub can make the process much easier.

Technical institutions are always striving to more efficiently enrol, retain and graduate students. On top of these standard priorities, the ability to share student data to external constituencies compounds the complexity of their IT challenge. Faster access to enrolment information, consolidating different records of students' information such as attendance, grades and documented special needs can provide a single view of actionable consolidated data. Unfortunately, most of the technical institutions are facing the problems to deliver the consolidated view. The factors affecting the technical institutions are a) lack of data availability b) budget and resource constraints, c) strategic considerations, d) duplication and inconsistency and e) decentralisation with some shared services. Integrating the data across the institutions is very difficult. The present research work will be providing a better solution for the above problems in the technical institutions.

Data integration flows are the back-end of a typical business intelligence (BI) architecture. Today, the design and implementation of these flows is a labor-intensive activity, consuming a large fraction of the effort in data warehousing projects. The current generation of ETL (Extraction, Transfer and Load) tools provides little support for systematically capturing business requirements and translating these into optimized designs that meet the correctness and quality requirements. The BI solutions will help even for the challenging requirements such as real-time execution, integration of structured and unstructured data, and more flexible flow of data between the operational applications and analytic applications resulting in even more complexity in integration flow design. Hence, it is important to create automated or semi-automated techniques that will help to deal with complexity. The data warehousing (DW) and Business Intelligence (BI) are increasingly becoming relevant technologies for the institutions offering technical education. Specifically, they have been pegged as the best methods to address the quality reporting requirements spelled out in the meaningful use criteria. However, BI is a potent tool for institutions offering technical education in general. It can support other types of regulatory reporting as well as a plethora of other analytic uses. Our research aims in creating the dimensional modeling in Business Intelligence environment so that all the problems can be addressed with better customer data integration.

e-CRM supports the collections of customer information and the process with customers through internet so the core technologies of e-CRM will be network and IT facilities. Organizations/Institutions should provide an efficient network and IT facilities sufficient for the usage of employees and able to support the use of e-CRM. In this fast growing technology society, e-CRM technologies must be one of other priorities that organization should consider. This is because e-CRM is the system that runs 24x7 operations. To maintain e-CRM and improve customer relationship continuously, organizations must run and operate the network and customer databases smoothly.

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