Current Trend and Literature on Electronic CRM Adoption Review

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Abstract. Electronic Customer Relationship Management (e-CRM) is a collection of processes, concepts, and tools that allow an organization to maximize their e-business applications. The purpose of e-CRM is not only to bring about changes in the area of marketing, but also to improve the company's efficiency in managing customers, then to increase customer service, safeguard precious customers, and to help provide organizations with analytic capabilities. The various opportunities provided by e-CRM including interactive and improvised customer relationships, managing customers' touch points and personalization options, even more than that, are a powerful way to gain a competitive advantage. Computer technology including customer profiles, decision support, and data warehouses are all applicable in e-CRM, however, web and computer related development make various additional technologies applicable to e-CRM. Such as voice portals (Interactive Voice Response), bots, virtual customer representatives and web phones (IP Telephony/VoIP). This study provides an analysis and review of e-CRM and its technologies. The 14 papers are the ones that satisfied the inclusion criteria used to select systems for the study. The summary of findings shows that the latest e-CRM technology has its advantages in helping customer service and the benefits of e-CRM from various aspects such as current challenges, developments, comparison between CRM and e-CRM, benefits, impacts, customer relationship, customer satisfaction and the importance of e-CRM. The result of this survey will give future direction to potential.

1. Introduction
In this highly competitive business world, marketing, sales and product promotion are essential for the success of a business. One of the important things to note in order to compete with companies in the market is customer satisfaction [1]. For the past few decades, most of the company's focus is on how to obtain new customers. Nowadays however, many companies have realized that it is important to maintain existing relationships with customers [2]. Customer Relationship Management (CRM) is a combination of technology, people and process to understand and manage the relationships between the company and its customers. The purpose is to maximize profits so that an optimal balance can be achieved between customer satisfaction and company investment. "CRM applications help to assess
customer loyalty and measurable profitability such as repetitive spending, how much money is spent and longevity" [3].

The most important thing and task in reducing lack of customers in a company is customer retention. The process that lasts a lifetime begins first through customer interaction. Products and services from the company are not only be considered through customer retention but also handling method on customers and the good intentions of the company. Customer retention can be achieved longer if the company meets customer satisfaction that is more than their expectations. The main focus is to increase customer value compared to profit on a profit basis. Generally, it is proper when customers are disappointed with the relationship they have with customer service [4] [5] [6] [7]. However, how customers react to disappointment is an important issue for marketing managers [8]. Satisfied customers do not always signify that they will be loyal [9], while disappointed customers do not always signify that they will become unfaithful [10]. Some customers do not take any action even though they have been disappointed, while others like to complain directly to the product/service provider [8]. In the end, the actions of buyers and how the providers react to these actions, can determine whether the customer has been maintained [11].

The world today, where everything has been combined with technology, CRM has been transferred to e-CRM. Electronic Customer Relationship Management (e-CRM) is a collection of processes, concepts and tools that allow an organization to maximize their e-business applications [12]. The purpose of e-CRM is not only to bring about changes in the area of marketing, but also to improve the company's efficiency in managing customers, then to improve customer service, safeguard precious customers, and to help provide organizations with analytic capabilities [13]. The value of e-CRM helps to reduce the expense and to make business practice more efficient and create competitive profits [14]. Then another purpose is always to make a system available for better customer service and also help provide assistance for analytical skills within a company [15]. The various opportunities provided by e-CRM including interactive and improvised customer relationships, managing customers' touch points, personalization options, or even more, are powerful ways to gain competitive advantages [15]. E-CRM has been applied electronically using internet, web browsers, and other electronic media (such as e-mail, call centers and others). Computer technology including data warehouses, customer profiles, and decision support are all applicable in e-CRM. However, web and computer-related development makes various additional technologies applicable to e-CRM, such as voice portals (Interactive Voice Response), bots, virtual customer representatives and web phones (IP Telephony/VoIP) [16].

CRM applications are created around the product functions and work. The application is made for corporate departments or individual employees and to provide customer service more effectively and to access customers related to intelligence.

The e-CRM application is created with customers as a frame of mind and gives customers a full experience on the web. Every different user has a view of information related with services and products available to them. Web-enabled CRM is usually created around one business unit or department and not for the whole company. In e-CRM on the other side, all applications are made for the entire company including all customers, supply providers and coworkers. E-CRM refers to simpler, more web-based electronic customer relationship management [17]. The main difference between CRM and e-CRM is in CRM customer contact. CRM customer contact is obtained through traditional ways such as telephone, retail or fax stores, while e-CRM can get customer contact via wireless, internet, email and the latest technology.

Web-enabled CRM is usually created around one business unit or one department and not the whole company. Whereas the opposite, e-CRM is an application made for the entire company including the customer supply provider. Traditional CRM does not allow companies to dynamically change marketing campaigns at home, while e-CRM provides these capabilities.
Table 1. Difference between CRM and e-CRM

| Criteria                        | CRM | e-CRM |
|---------------------------------|-----|-------|
| Interface system                | Work with "back-end" applications through an ERP system | Made for "front-end" applications as they turn interfaces with "back-end" applications through ERP data warehouse and data mart systems |
| Customer contact                | Customer contact starts through traditional methods such as retail store calls and faxes | In addition to the telephone, contacts can be started via internet, e-mail, wireless, mobile and PDA technology |
| Overhead System (client computer) | Web-enabled applications require a PC client to download various applications | Does not require these requirements, a browser is a customer link tool to e-CRM |
| Customization and personalization of information | A personal view for a different audience is not possible. Individual customization is needed for program changes | Individual views that are very dynamic and personal based on spending and choices are possible. Each individual audience can customize the view |
| Focus system                    | The system is created around the function of the product and its work | Systems made around customer needs |
| Modification and maintenance system | Implementation becomes more expensive because of the system | Reduced costs and time. The implementation and expansion system can be managed in one location on one server |

The real difference in CRM and e-CRM technology is the appearance of web-based applications. It is easy to say that the use of internet CRM is a strategy that is indispensable and not just for luxury. Therefore, in this literature review, the results of the benefits of e-CRM from various aspects such as current challenges, developments, comparison between CRM and e-CRM, benefits, impacts, customer relationship and customer satisfaction and the importance of e-CRM will be discussed in relation to customer interaction. The aim is to find out what future potentials can be done to increase customer interaction with implementation through e-CRM.

2. Introduction

The terms CRM and e-CRM have been explained earlier in the introduction. The purpose of this study requires the exploration of the importance and benefits of e-CRM as shown in Table II.

Table 2. Literature Review Table for E-CRM

| Author             | Objective                                                                 | Contribution                                                                 | Challenge                                                                 | Conclusion                                      |
|--------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------|
| Aileen Kennedy     | Describing many opportunities for using e-CRM in marketing for companies. Such as increased interaction and relationships between customers by offering options in personalization, which all options are a source of competitive advantage. | Discussing the challenges in e-CRM such as customer relationships and interactions, setting up an online channel, the challenges of data integration and IT architecture. | The use of this e-CRM can limit the intimacy of the relationship and interaction between customers and the company because there is no physical relationship and interaction. So that these online and remote relationships and interactions result in more difficult trust in customers. Because these beliefs becoming harder, customers also becoming more difficult to share their data. | Guarantees and privacy policies are important here so that trust can be built for the effectiveness of e-CRM in the company. |
| Daminni Grover     | Describing several developments that have been made in e-CRM that facilitate online services to customers. | According to the study, it was stated that e-CRM technology can be implemented in two ways, namely through e-commerce web portals and through customer cycles. This paper describing how the processes implemented to each ways. | Customer demand by the company is now required by the company to provide access to multiple communication channels quickly such as web chat, e-mail, web and telephone, because the channel has the ability to flawlessly integrate from one intermediary to another. | The e-CRM system must allow access to customers through a variety of touch points such as face-to-face contact, fax, VoIP, web forms, e-mail, web self-help and phone. Then it must also allow access to user systems through various client systems such as personal digital assistants (PDAs), personal computers and mobile phones. |
### Rashid Farooqi et al (2011) [20]
**Explaining the results of the comparison between traditional CRM and e-CRM.**

The results of this study state that e-CRM can provide several benefits better than using traditional CRM. The internet has helped to progress in e-CRM. Because the internet has made many interesting features that are attractive to customers and companies. So in order to strengthen the function from the internet, the companies need a new approach for the e-CRM.

The difference between web-based CRM and e-CRM is that web-based CRM is designed only for around the department and one business unit is not the entire unit of the company while e-CRM covers all of the company's units. Traditional CRM implementation takes much time and cost while implementing e-CRM is very fast with lower costs.

### Alok Kumar Rai (2011) [21]
**Describing the benefits obtained from using e-CRM and what technologies are used in implementing e-CRM.**

The results of this study mention that e-CRM provides many advantages and also information relating to what technology is used in e-CRM.

The challenge that occurs in this research is when effectiveness in managing moment of truths with customers. This section becomes the difficult part of a customer and company relationship.

The flow of information in e-CRM is online, real time and continuous. In the study also mentioned that the previous database system integration can be done by integrating the database into e-CRM systems in order to obtain the effectiveness of competitive advantage.

### Somayeh Salehi et al (2015) [22]
**Explaining how e-CRM can affects the customer loyalty to companies that use e-CRM features especially on banks.**

The results of the present study show that the implementation of e-CRM has a positive and significant impact on customer loyalty.

Now, customers expect more for more effective and efficient banking customer service, especially shorter periods of time and more cost-effective expenses so that customers will be more satisfied. Therefore, customer satisfaction is a challenge in the banking world to continue to innovate in the use of information technology in the future.

The influence of e-CRM by the bank will have a positive impact in the form of increasing customer satisfaction which is determined the level of customer loyalty to the bank where the e-CRM has an important role in it.

### N. A. B. Ismail et al (2016) [23]
**Explaining how e-CRM especially the use of E-ticket services can affects the customer satisfaction to airlines in Malaysia.**

The results of the present study show that the majority of respondents who were the subject of the study were satisfied with e-services provided by airlines in Malaysia.

The challenge is that there are limitations to online features in customer service, especially for customer satisfaction and loyalty to E-ticket services for airlines in Malaysia. Another challenge is response bias because most customers have more positive responses to the airlines that they are more familiar with to use.

E-CRM in pre-purchase and post-purchase impacts positive for the relationship between the company & customers and the level of customer satisfaction that increased significantly. This level of customer satisfaction can indirectly make a long-term relationship and guide customer loyalty between the customer and the company.

### Eric E. Mangunyi et al (2017) [24]
**Explaining relationship between the level of customer loyalty and e-CRM with case studies in the Kenyan commercial bank, using a cross-sectional survey design method whose data was collected through several customer samples using a self questionnaire administered conventionally in a Kenyan international bank.**

The results of the present study show that e-CRM features in pre-service, when service and post transactional has a positive impact and a significant relationship with pre-service e-CRM features & loyalty and when service significantly predicts loyalty. The result clearly supports the proposition that e-CRM construct is an antecedent to loyalty.

The challenge in the study is that there are limitations in the provisions for sampling because the convenience samples are used. The positive impact of post-service features but not significant for customer loyalty can be further explored.

The results of the findings based multiple regression analysis and on correlation indicate that the e-CRM feature in pre-service, when service and post transactional has a positive impact and a significant relationship with pre-service e-CRM features & loyalty and when service significantly predicts loyalty. Improvement for practical e-CRM can be a strategic competitive tool that can impact both relationships between customers and banks.

### 3. E-CRM Technology

CRM has developed rapidly. CRM has now become e-CRM because of the increasingly sophisticated technological development. Kennedy (2006) mentioned in his study that the use of e-CRM can limit the intimacy of relationships and interactions between customers and companies because there are no
such relationships and interactions physically. However now, it can be overcome with the current of e-CRM technology. Its effect is very strong on customer loyalty to companies that have used e-CRM features based on a study conducted by S. Salehi et al (2015), who found a positive impact on the level of customer loyalty. Findings by N.A.B Ismail et al (2016) and E. Mang'uni et al (2017) also support this theory, which the effect of using features in e-CRM for the level of customer satisfaction has a positive impact on customer loyalty.

Traditional CRM implementation takes too much time and cost, while e-CRM has proven to cut costs and can be implemented very quickly as proven by Rashid Farooqi et al (2011). Moreover, the flow of information in e-CRM can also be done online, real time and continuously. In a study conducted by Alok Kumar Rai (2011) database systems can be integrated with e-CRM systems in order to obtain the effectiveness of competitive advantages. In addition to the benefits derived from the benefits of e-CRM, various technologies in e-CRM are also mentioned in a study by Alok Kumar Rai (2011) such as Voice Portals (Interactive Voice Response), Bots, Virtual Customer Representatives and Web Phones. The e-CRM technology that is developing until now is explained respectively as follows.

3.1. Chatbots
Chatbot is a computer program or an artificial intelligence that contains a conversation through auditory and textual methods. Based on the research chosen as the reference for this study, the chatbot will be categorized as follows:

3.1.1. Techniques for speech conversation system
In a study by Sameera et al (2015), 9 chatbots were surveyed based on their contributions to previous studies [25]. Chatbot was chosen based on each development from a decade ago. Comparisons between chatbot design techniques were carried out by referring to studies selected with the Loebner Prize Winning chatbot technique. The results showed that the development and improvement of chatbots did not develop quickly according to predictions because the methods and approaches carried out were too varied in building a chatbot. Which chatbot technique is the best is still under debate and no approach in general can be identified. Chatbot, which has been designed for dialogue systems in research references, is generally still limited to a number of applications. Chatbot with a more general purpose needs development by building more comprehensive knowledge bases. With product chatbot dialogs such as Microsoft Cortana have been commercialized on a basis, development must be carried out continuously, but a common solution is still lacking.

3.1.2. AIML based chatbot
In a study by Md. Shariare Satu et al (2016) there were several applications that were integrated with AIML-based chatbots which were then analyzed one by one [26]. There were 12 applications that have been analyzed. These applications were related to e-learning, e-government, cultural heritage, web-based models, dialog models, semantic analysis frameworks, interaction frameworks, humorist experts, network management and adaptive modular architecture. The existing system is integrated using AIML chatbot because integrated systems have a significant role in various client services. It is very inconvenient for a visitor to understand the system easily without any. Therefore, the service is provided by chatbots to visitors. The integration of chat service provides service providers with additional business facilities for certain services. Therefore, in this study, the service has a broader business field to manage customers using more efficient and flexible ways.

3.1.3. Implementation of techniques with various chatbots
In a study by Aditya Desphande et al (2017) several chatbots were implemented with various techniques [27]. The early history of chatbot was also discussed, namely ELIZA from 1964 until the latest in 2016, Tay, a Microsoft-made chatbot that triggered a controversy on Twitter by issuing inflammatory tweets and then was withdrawn as soon as possible after the incident. With the development of these technologies, chatbots have become increasingly important over time with various domains such as educational, scientific and commercial. The most important chatbot
applications are financial advisors (Credit Score Coach), personalized stylists, free legal aid provider (DoNotPay), medical advice preliminary provider, personal concierge services and many more. The widest chatbot application is in the e-commerce domain for automating customer service.

3.1.4. Cloud platforms to develop a chatbot
In a study by Amit Patil et al (2017) various comparative tests were conducted for cloud platforms to develop a chatbot [28]. There were 3 cloud platforms discussed in this study. The selection of a cloud-based platform is often used by public, namely Microsoft Bot Framework, Heroku and IBM Watson. The cloud platform discussed in this study has different features and functions, with the elaborated analysis and the integrated environment in it. It can be chosen as an effective and efficient cloud platform for implementing chatbot technology according to the preferences of each user who wants to use the cloud platform.

3.2. Virtual Customer
A virtual customer handles customers without requiring face-to-face contact or online. Virtual customer community has developed rapidly which offers several features from online customer discussion forums to virtual product design that make customers involved in product development activities so that they are more feasible and cost effective. In a study conducted by Nicholas Roberts et al (2016), it was examined what the impacts of the Virtual Customer Community for an organization are [29]. There were 23 studies that were used as references. There are two implications obtained from the results of these studies, including:

i. Practically, the design and virtual implementation of customer communities must make customer interactions increase. From the perspective of organizational communication, organizations can actively talk to customers by initiating discussions for products and services first and hiring engage customers in conversations and employees to supervise within the virtual customer community. Then in addition to the practitioners, it should be very intent when developing a virtual customer community strategy. It must be done by setting goals and objectives to be achieved in a virtual customer community.

ii. In theory and research, the virtual customer community interactivity plays an important role in a company's ability to innovate. Customers prefer selecting and communicating for the development of products and services they have known before. Such interactions in a virtual customer increases knowledge and companies with strong absorptive capacity can absorb this knowledge and apply it to the development of incremental innovations. This study also mentions that there is no proof of a relationship between absorptive capacity and radical innovation when a company promotes customer interaction within a virtual customer community.

3.3. Interactive Voice Response
The Interactive Voice Response (IVR) system is an automated telephony system with the capability to call and is relevant to the appropriate destination, as well as interacts with callers. The research conducted by Itorobong A. Inam et al (2017) is about the review of IVR systems. There are 38 IVR systems and comparative analysis that have been studied that are divided into 5 different domains [30]. The analysis obtained includes:

i. VoiceXML is most often used as the vocal interface most often by most IVR systems in developing touch-tone and speech applications. The reason is because VoiceXML is the standard application language for voice dialogues.

ii. The Voxeo prophecy phone emulator is also a voice server that is widely used for hosting IVR systems. This is because Voxeo makes it easy to develop and deliver IVR. Security is also stronger and more flexible.

iii. The MySQL database is the main database on the back-end IVR system. Information provided to the user via the interface by key presses using a predefined menu structure. The information and menu structure usually remain fixed throughout the system and changes require manual intervention.
3.4. Voice Over Internet Protocol

Voice Over Internet Protocol (VoIP) is the transmission of multimedia and voice content over Internet Protocol (IP) networks. The research conducted by Sheetal Jalendry et al (2015) is about a detail review of VoIP. Then the explanation of the VoIP component is divided into four parts, namely:

3.4.1. VoIP Signaling Protocols

When making a call through the internet, signaling protocol plays an important role because it can strengthen its network components to communicate with one another, manage and cancel calls. The main role for a signaling protocol can be divided into 4 functions, namely:

i. Call participant management
   Allow endpoints to leave or join ongoing sessions.

ii. Session establishment
   Callee can determine if it will divert, reject or accept calls.

iii. Session negotiation
   The endpoints involved in the call should concur upon a set of properties for the session.

iv. User location
   The caller must find the location of the callee.

VoIP protocol can be divided into two, namely:

i. H.232
   Protocols, elements and procedures are specified by H.232 standard that provides multimedia connection across packet-based networks. There are 4 elements that provide the H.232 system, namely gateways, gatekeepers, terminals and multipoint control units (MCU).

ii. Session Initiation Protocol (SIP)
   SIP (Session Initiation Protocol) is a communication protocol used for controlling and signaling multimedia communication sessions such as instant messaging, online gaming and various services. There are 5 elements that provide SIP systems, namely redirect servers, proxy servers, network elements, gateways and user agents.

3.4.2. VOIP Codecs

Codec is a compression process from the results of voice / video encoding algorithm that has a permit calling transmission over an IP network. Each algorithm requires a certain amount buffering data before it is processed by all services, gateways, programs and others that support various codecs.

3.4.3. Real Time Protocols

Application requirements by delivering video and audio and real-time characteristics through IP networks are carried out by real time protocols. Elements of real time protocols consist of RTP (Real Time Protocol) and RTCP (Real Time Control Protocol).

3.4.4. VoIP Attacks

VoIP attacks can be carried out by various attacks, including:

i. DoS (Denial of Services) attack is an attack on electronic networks that has a connectivity or service rate. There are two types of DoS attacks, namely VoIP signaling DoS attacks that attackers flood the gateway, IP phone, and other media VoIP components with a very large number of real time packets.

ii. Man-in-the-middle attacks are those which prevent calls for signaling masquerades and SIP message traffic as calling party to the called party and after the attacker takes over the position, then he/she can hijack the call.

These are four technologies currently used in e-CRM [21]. Therefore, in this study researches on technologies are also discussed and shown in Table III as follows.
Table 3. Review of e-CRM Technologies

| Author                        | Objective                                                                 | Contribution                                                                                                                                                                                                 | Results                                                                                                                                                                                                 |
|-------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sameera et al (2015) [25]     | Describe each chatbot technique for the speech conversation system.       | Various explanations have been made of research in the form of a chatbot survey with AI speech conversation system over the past decade. The survey was conducted with various aspects. Among other things, the analysis of speech and response that has been carried out, then reviewing the latest chatbot designs and also what factors are selected in influencing the chatbot design. | In the study survey chatbot has been selected from its development a decade ago. There are nine chatbots that have been surveyed based on each contribution in each of these studies. From the survey above it can be concluded that the development and improvement of chatbot does not develop according to the predicted prediction average due to the various methods and approaches used to build a chatbot. |
| Md. Shahriare Sato et al (2016) [26] | Explain and review each of the integrated applications with AIML based chatbot. | The research conducted has obtained results that the applications that have been reviewed not only have provided many useful services, but also can provide solutions to problems and interact with customers. Their problems through AIML chatbot rather than through humans themselves. | The existing system is integrated using AIML chatbot. Various APIs and packages with lightweight AIML files make this system more interactive and flexible to be used in various places. Automated conversational agent based systems play a significant role with the user. Therefore the costs incurred by service providers are reduced by using automated conversational agents rather than human conversational agents. In addition, users get facilities with full-time chat services that make users interested in using this service. The integration of this chatbot service provides service providers with additional business improvements for certain services. Therefore in this study, the service has a broader business field to manage customers using smart machines in a more flexible and efficient way. |
| Aditya Desphande et al (2017) [27] | Explain and review each implementation technique with various chatbots. | In this study explained the initial chatbot development to artificial intelligence systems that have helped a lot in the business sector because it has helped by automating customer service and reducing human intervention. | The importance of chatbots is increasing along with technological developments in various domains such as education, scientific and commercial. Various mobile devices can also be implemented in chatbots as intelligent personal assistants in the field of social networking to provide personalized marketing to customers as well as education such as artificial tutors so they can provide personalized and instant feedback to learners. Human computer interaction can be improved through chatbots. To improve existing customer relationships, chatbots can help and reduce human effort. |
| Amit Patil et al (2017) [28]   | The purpose this paper is explaining between cloud-based chatbot technology from various cloud platforms. So anyone can choose the cloud platform to build the chatbot. | The research conducted in this study has obtained results comparisons between cloud-based chatbot technology which results are more effective and efficient for the chatbot technology. | The chatbot discovery has made developers and messenger apps and businesses work together and create a new environment. There are so many goals that can be developed for chatbots such as customer services, news updates, shopping, reservation, food order and much more. By choosing the analysis and results that have been processed by this research, everyone can choose which cloud platform to use to build chatbots. |
| Nicholas Roberts et al (2016) [29] | The research conducted by Nicholas Roberts et al aims to find out what impact can be given by the virtual customer community interactivity on organizational innovation then what relationships can be gained between organizational innovation and absorptive capacity. | The impact obtained is that absorptive capacity is positively related to incremental innovation and is negatively related to radical innovation. | The communication relationship between the organization and the customer is successfully changed communication through virtual customer communities in several ways that affect the innovation and learning activities of a firm. |
### 4. Conclusion

With the latest technological advancements, CRM development has increased dramatically, which later became e-CRM that makes it easier for CRM to improve customer service by reducing costs, increasing efficiency and effectiveness of the company in serving customers. E-CRM has proven to cut costs and its implementation is very fast compared to traditional CRM that takes a lot of time and money. There are 14 literature reviewed, 7 of which contain reviews of the latest e-CRM and 7 of which contain reviews of technology in e-CRM that are divided into four namely Interactive Voice Response (IVR), bots, virtual customer representatives and web phones (IP Telephony / VoIP). Each review has its own future research, which can be an insight for the researchers to make this research as a reference material for future research, both academically and practically.

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