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Propose an E-CRM Model based on Mobile Computing Technology in Pharma Distribution Industry

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Abstract

In today's world, the competition between all business areas and companies including pharma distributor companies has increased dramatically, so it is very important for active companies in the pharma distribution industry which deal with a large number of customers in a B2B market to establish a deep and long-term relationship with their customers and manage that relationship effectively. Since the CRM which now is enriched by new emerging technologies in terms of e-CRM and m-CRM is under developing rapidly, it can play a critical role for empowering these companies to strengthen their relationship with their customers. In this research it has been tried to have a complete review of mobile computing technology concept and its effect on CRM. The research methodology is basically qualitative. After a literature review, using qualitative research methods and deep interviews with a group of 8 industry experts, the whole concept of the initial model was derived using Thematic Analysis method. The Grounded Theory approach was applied to extract the main factors and sub-factors of the final model. Additionally, some of \research techniques such as Dematel, ANP and Super Decision software were used to investigate the interdependency, importance and priority of factors and sub-factors. At the last stage a new model for e-CRM in pharma distribution industry based on mobile computing technology has been proposed. The four key components of the model are Quality of Content and Services, Organizational Readiness, Quality of System and Communication, Customer Mobile App.

Keywords: e-CRM, m-CRM; Customer Relationship Management; Mobile Computing Technology; Pharma Distributors.

1- Introduction

In recent years, the competitive environment of various kinds of businesses has increased. This environment which includes the pharmaceutical distribution industry has affected most of pharma distributor companies. The diversity of goods and quality of their distribution services has increased significantly the selection power of customers in a B2B market. Due to the entrance of new distribution companies in the market and intensifying the competition, a national big challenge has been emerged recently [1]. So it is very important for these companies to establish a deep and long-term relationship with their customers and manage that relationship effectively which is the main mission of a CRM solution. In this situation, CRM should be considered as one of the most important key success factors for survival in competitive market. The CRM concept has evolved in such a way to maintain a long-term relationship with the customers. The use of CRM systems is becoming increasingly important to improve customer life time value [2] and is more important in such companies that have a wide relationship with customers and deal with a large amount of customers especially in a B2B market such as pharma distributors. On the other hand, Internet has touched almost every sphere of our lives. The impact of the process of managing and interacting customers via the internet has affected CRM too. By leveraging the internet for customer management we get the new structure of CRM known as e-CRM [3]. E-CRM is a system which tries to provide better customer services with support [4]. In recent years, many organizations have identified the need to become more customer-facing with increased global competition. Hence, e-CRM has become an essential for many organizational strategies [5]. By emerging new technologies such as smartphones and mobile computing technology, all aspects of businesses including customer relationship management have been affected rapidly and

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mobile CRM (m-CRM) concept was introduced. Mobile Customer Relationship Management (m-CRM) system is one of the recent advancements in CRM solutions. Mobile CRM promotes satisfaction to customers through the mobile medium on communication [6]. mobile computing is a kind of combination which enables a real-time connection between a mobile device and other computing environments, such as the Internet or an Intranet. This innovation is creating a revolution in the manner in which people use computers. The new computing model is basically leading to ubiquity—meaning that computing is available anywhere, at any time [7]. As we know that the ubiquity is a main part of business environment of all pharma distribution companies and mobile computing technology is the core of ubiquity, we expect that those pharma distribution companies which has empowered their CRM strategy with new mobile computing technologies would be able to increase their customer's satisfaction and loyalty more efficient and more effective.

So we've summarized the main research problem as follows: The Intensifying of competitive atmosphere in pharma distribution industry, has caused big challenges both in national level and enterprise level. Considering the critical role of effective customer relationship management in pharma distributors to survive and grow in such a competitive atmosphere, how we can apply mobile computing technology capabilities to help pharma distributors for establish an effective and closer relationship with their customers.

This research aims to extract and propose a suitable model to those pharmaceutical distribution companies willing to implement e-CRM system based on mobile computing technology. The main research questions are "which is the suitable model for pharma distribution companies to implement an e-CRM system based on mobile computing technology?" And "what are the main factors and sub-factors of the proposed model and "how is their interrelationship and their relative importance?"

2- Literature Review

2-1 Customer Relationship Management (CRM)

The customer relationship management concept has been born in ancient world and has been continued during centuries anonymously until the middle of the twentieth century [8]. Interest in Customer Relationship Management began to take its importance in 1990s [9]. Around the late 1990s, the first CRM systems were introduced [5] and most of businesses nevertheless of the size are still encouraged to adopt CRM to create and manage the relationship with customers well effectively and efficiently [9]. In recent years many organizations have identified the need to become more customer-facing with increased global competition. Hence, customer relationship management (CRM) has become an essential for many organizational strategies [5]. Companies have, therefore, invested significantly in the implementation of CRM during the years [10].

CRM, is a business approach that seeks to create, develop, and enhance relationships with carefully targeted customers in order to improve customer value and corporate profitability and thereby maximize shareholder value [11]. Recent literature explained CRM conceptualizations according to specific implementation dimensions with each dimension representing a set of business activities [10]. CRM is a comprehensive approach for creating, maintaining and expanding customer relationships [12]. CRM aims at developing sustainable, long-lasting affiliations between companies and customers [3]. A list of desired CRM benefits is collected and summarized in the table 1.

Table1. Summary of CRM benefits [13],[14]

Authors	Core CRM Benefits
Chen and Popovich (2003)	• Increases data sharing across selling organization • Improves customer service • Improves cross-selling/up-selling • Improves customer targeting • Enables better personalization of marketing messages • Provides better self-service options for customers • Improves buyer–seller integration
Buttle (2004)	• Reduces cost to serve • Increases revenue • Increases customer satisfaction and loyalty
Jones, Brown, Zoltners and Weitz (2005)	• Improves customization of services and product offerings • Enhances ability to create long-term partnerships • Improves salesperson efficiency and effectiveness
Stan Maklam (2005)	• The ability to gather customer data • Identify the most valuable customers and increase customer retention is highly • Learning from customers (customer knowledge)
Eggert, Ulaga and Schultz (2006)	• Improves support for product development • Increases supply-chain efficiencies via personal contact • Enhances supplier know-how
Blery & Michalakopoulos (2006)	• Closer relationship to its customers and offer phone services • Servicing customers and receive information to develop the level of service offered to customers
Richarsd, Keith & Jones (2006)	• Target commercial customers

	• Offerings from different channels • Enhanced customer service • Customized products and services
Wang, Sedera & Tan (2009)	• Advance responsiveness • Accelerate delivery lead-time • Enable customer knowledge management • Develop customer segmentation • Targeting the most profitable customers • Improve product and business innovations • Enhance customization of marketing efforts and messages to individual customers • Permit multi-channel integration • Allow multi-channel communication • Enable personalized products and services • Improve product separation • Focus on customers and their needs • Provide customers a "one-to-one" skill
Popli & Rao (2009)	• Personalized services • Customers knowledge and experience empowered • Deliver high quality service • Meet customer needs • Employee empower more time to serve up customers • Advanced satisfaction ratings • Targeted product and service contributions can be timed to match with customer actions and requirements
Keramati, Mehrabi & Mojir (2010)	• Individualizations of market • Customization of product and services
Schubert & Williams (2010)	• Improved responsiveness • Valuable time savings during reduction of the search effort • Seamless communication
Kuo, Wu & Peng (2011)	• Enhancing customer's attentiveness • Consolidating helpful services
Kiat Loh et al. (2011)	• Describe diverse customer group that will be served in different ways • Customer service and support service operations • Predict potential and personal customer's behavior
Amoako (2011)	• Improved capability to target profitable customers • Integrated contributions across channels • Individualized marketing communication
Vazifehdust et al. (2012)	• Identify and target their best customers • Allowing the formation of individualized relationships with customers • Identifying the most profitable customers and providing them the highest level of service • Understand and identify customer needs

Information system, technology, e-business, management, knowledge management, human resources management and marketing are the key disciplines of CRM [15]. CRM is touted as an imperative strategy to enhance a firm's competitive advantage [16].

2-2- E-CRM

The internet is creating tremendous impact on businesses also in interacting, nurturing, maintaining their customer bases. The impact of the process of managing and interacting customers via the internet has affected CRM too. Because of the growth of the Information Technology the usage of internet began to grow up and this in turn provided opportunities to marketing through transform the way of relationships between businesses and their customers [9]. By leveraging the internet for customer management we get the new structure of CRM known as e-CRM. E-CRM is all about managing customers online using internet as the primary channel of interaction [3]. E-CRM refers to CRM using internet technology plus a database, OLAP, data warehouse, data mining, etc. [17]. More and more businesses begin to attach great importance to electronic customer relationship management (e-CRM), which focuses on customers instead of products or services, that is, considering customer's needs in all aspects of a business, ensuring customers' satisfaction [2].
The distinction is made between CRM and e-CRM, on the basis of three parameters of Approach, Cost and Service [3]. The Fig 1 shows the difference between CRM and e-CRM.

Table 3 –the difference between CRM and e-CRM [3]

	Approach	**Cost**	**Service**
CRM	Fragmented	High	Efficient
e-CRM	Consolidated	Low	Effective

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 [18].

2-3- Mobile Computing Technology

Mobile computing, is a computing paradigm designed for workers who travel outside the boundaries of their organizations or for any other people traveling outside their homes. As an example, salespeople were able to make proposals at customers' offices. This, enables a real-

time connection between a mobile device and other computing environments, such as the Internet or an intranet. This innovation is creating a revolution in the manner in which people use computers. Mobile computing and commerce are spreading rapidly, replacing or supplementing wired computing. IT involves mostly wireless infrastructure and may reshape the entire IT field [7].

Nowadays, Smartphones have numerous information and communication technology functions that are comparable to those of old computers. It is estimated that the global revenues from apps will make abundant business opportunities [19]. Current smartphones and tablets contain more computing power than many of the formerly known supercomputers, which used to fill an entire room. The shift in devices has already occurred in many countries across different continents as more people are using their smartphones rather than traditional PCs. As technology is progressing to miniaturize devices, increase computing power and, especially, decrease the price of electronics, smartphone adoption will only accelerate [20]. In 1985, the Cray-2 supercomputer was the fastest machine in the world. The iPhone 4, released in June 2010, had the power equivalent to the Cray-2; now, the Apple Watch has the equivalent speed of two iPhone 4s just five years later. Nearly everyone will soon have a literal supercomputer in their pocket [21].

2-4- Mobile-Customer Relationship Management

With the development of wireless technology, mobile devices, such as smartphones and smart watches, are becoming the most effective tools for communication in human's daily life. The popularity and availability of mobile devices can help mobile users enrich experience of various services provided by mobile applications without the constrain of time and place. Mobile applications are becoming increasingly ubiquitous and can provide better user experience on mobile devices [22]. The mobile application is in rapid growth and dissemination in business and enhancement of customer satisfaction has emerged as a core issue [23].

One primordial capacity needed for implementing a CRM strategy is the ability to communicate with customers on an individual basis. For that reason, mobile technologies represent an appealing additional channel which can complement the existing channels. Among the advantages of the mobile channel which are highly relevant to CRM are the personal character of mobile devices which allows an individual customer reach, the interactivity brought by its quick message delivery and response, its reachability and ubiquity. It is the only medium enabling a spontaneous, interactive, direct and targeted interaction with customers, anytime, anywhere. This makes it a valuable channel despite the drawbacks of mobile devices. For that reason, the future CRM solutions is envisaged to combine traditional, Internet and mobile channels [24].

m-CRM has been defined as the communication, bilateral or unilateral, that is related to marketing activities via mobile phone in order to build and maintain relationships between the consumer and the company. For this purpose, a combination of strategy, technology, and human resources is required. There are two perspectives to understand CRM in the context of new technologies. On the one hand, from the perspective of technology, m-CRM is seen as a technological tool applied to marketing in order to reduce costs and increase the efficiency of the processing information between buyer and seller. On the other hand, from the strategic perspective and relationship marketing, m-CRM is seen as a long-term management approach that companies or organizations carry out via mobile channels in order to get very different benefits. In the first perspective, the benefits of the m-CRM are the result of the application of mobile technology to the management of relationships with customers. While in the second perspective, establishing and maintaining of mutually profitable and long-lasting relationships between the company and its customers through mobile channels are benefits of m-CRM [25]. The ubiquity of mobile computing devices, such as smartphones and tablets, and the proliferation of mobile customer relationship management (m-CRM) applications, may lead to increased CRM adoption and higher returns on CRM technology investments [26].

3- Research Methodology

This research is a fundamental because of its effort for combination of two areas of knowledge including customer relation management and mobile computing technology to develop a new model and also is an applied research, since its results would be useful in making decisions and formulating policies for pharma distribution industry and those companies active in this industry. It's more an exploratory research rather than descriptive. A qualitative research approach has been selected to conduct this research. Qualitative research is a type of research that explores and provides deeper insights into real-world problems. It gathers participants' experiences, perceptions and behavior [27]. The group of experts in this research includes 8 senior managers of 7 largest pharma distribution companies of Iran.

To contact this research towards answering the main research question, a list of steps followed as follows:

i. A complete literature review through library studies and scanning the international scientific databases from 2005 for collecting secondary data.
ii. marking, classifying and clustering of collected data for summarizing the findings of previous researches and models.

iii. Using in-depth interview method for collecting primary data. The group of experts were interviewed separately to answer the main research questions.
iv. Analyze data gathered from deep interviews by using Thematic Analysis method. Then the Grounded Theory method and its coding techniques were applied for conclusion the results towards a theoretical model.
v. Extract of experts' opinions about weigh or importance of model's main factors and sub-factors also their interactions with the help of paired comparison questionnaire tool.
vi. Determine the interdependencies and priorities of main factors and sub-factors using DEMATEL technique, ANP method and Super Decision software. Decision making trial and evaluation laboratory (DEMATEL) is considered as an effective method for the identification of cause-effect chain components of a complex system [28].
vii. Summarize the research findings and propose the final model.

4- Data Analysis

4-1- Expressing Findings

After a vast review of literature and proposed models for recognizing the main factors of e-CRM in previous researches, a list of factors has been collected in a table which is displayed in table 2.

The most important finding of this step is to realize that the main goal of any CRM system is creating or enhancing customer loyalty to the organization. This loyalty itself is rooted to two main factors: customer satisfaction and customer trust.

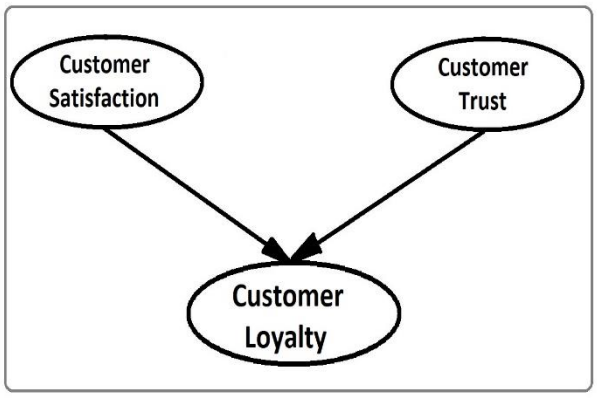


Fig. 1 Customer Loyalty is rooted in customer's satisfaction and trust [29],[30],[31]

In the next step, several deep interviews with experts of pharma distribution industry were conducted to investigate the main factors and sub-factors of an effective e-CRM system based on mobile computing technology in this industry and extract the suitable model in this regard. To achieve this, thematic analysis method was applied to analyze interviews and grounded theory approach was used. The group of experts were top managers of seven largest pharma distribution companies of the country. These managers were contacted through National Association of Distribution Industry and also direct relationship with their companies. An expertise criterion was applied for choosing experts.

Using open coding, axial coding and selective coding techniques in grounded theory approach with a back and forth process, a complete list of categories was extracted from deep interviews. Table 3 and Table 4, show the results of open coding, Axial coding phases and categorizing the concepts.

Table 3. Open coding of research data

ID	Elements	Concepts
C1+ C2+ C3+ C4+ C7+ C12+ C15+ C23	Permanent access of customer to goods inventory of the company+ Instant access of customer to announced discounts+ Instant access of customer to announced promotions+ Permanent access of customer to his accounting information+ Financial transparency+ Access to required detailed data+ Providing useful information for customer	Required Content
C33+ C35	Customizing services for customers+ Possibility of real-time monitoring of orders	Customer's Desired Services
C22	Possibility of systematic bilateral interaction	Systematic Bilateral Interaction
C5+ C32	Need for business process reengineering+ Rapid response of employees to the customer's requirements	Business Process Reengineering
C18+ C20+ C21+ C28	Strong support by senior management+ Accompaniment of mangers of distribution centers+ Customer-oriented strategy+ Encourage innovation	Senior Management Support
C6+ C31	Direct communication channel of company for customers+ Stability of systematic communication	Direct Communication Channel
C26+ C27+ C34+ C39	System quality in terms of being error-free+ Simple and user-friendly system+ Flexibility of system for customers+ Regular updating of system	Qualitative Features of System
C30	Need for system security and privacy protection	System Security

C19+ C24+ C25	Staff training and culture development+ Motivating employees and incentive plan+ Recognition of system benefits by employees	Employees role
C10+ C11+ C13+ C17+ C36+ C37	Quickly obtain customer orders+ Online submitting complains and comments of customers+ Real-time scoring system for customers+ Ability to Perform system calculation+ Ability to geo-monitoring for customer shipment	Mobile Systematic features
C17	Ability to perform offline data processing by customer	Offline Processing
C8+ C14	Instant notification for customer Advanced notification for customer	Instant Notification
C9+ C38	Systematic customer satisfaction evaluation Instant satisfaction survey of customers	Real-time Satisfaction Survey
C29	Using mobile social networks	Mobile Social Networks
C40	Necessity of a customer-side mobile application software	Customer mobile app
C41+ C42+ C16	Equip the sales team with software+ Providing strong IT infrastructure+ Professional knowledge in IT department of company	Technology Infrastructure
C43+ C47	Customer loyalty as the main goal of CRM+ importance of customer satisfaction and customer trust in customer loyalty	Customer Loyalty
C44	Importance of investment by pharma distributors on new emerging technologies	Companies Investment on New Technologies
C45+ C58+ C59	Impact of macroeconomic policies on manager's decisions in pharma distributors+ Impact of business barriers on manager's decision making+ Impact of uncertainty in national economic outlook on manager's decision making	Macro economics Policies
C46	Importance of futurism in customer relationship management	Importance of Futurology
C48	Customer loyalty as the key factor for surviving in today's competitive environment	Survive in Competitive Environment

C49	Organizational culture as a key contextual factor for change	Contextual Impact of Organizational Culture
C50	Impact of macro organizational (holding) policies on manager's decisions	Holding's Policies
C51	Impact on healthy competition in pharma distribution industry	Healthy Competition in Health business
C52	Impact on general health	Improvement in General Health
C53	Collaborative activities of guild associations and NGOs on developing infrastructures	Collaborative Activities of Guild Associations
C54	The role of business alliance and coalition among pharma distribution on common investment	Business Alliances and Coalitions
C55	Impact of competitive intensity on manager's decision making	Intensifying Competitive Environment
C56	Impact of social culture on customer's welcome to new technologies	Social and Economical Context
C57	Impact of tendency to maintain current situation in pharma distributors	Tendency to Maintain Current Situation
C60	Importance of providing different resources in the company	Enterprise Resource Planning
C61	Impact of governmental health policies on manager's decision making	National Helath Macro Policies
C62+ C63	Impact of technical, communication infrastructure of the country for mobile-based services+ Impact of developing new generations of mobile communication system in the country	Technical, Network and Telecommunication Infrastructure
C64	Impact of monitoring and modeling of competitor's behavior by pharma distributors	Modeling from Competitors Behavior
C65	Impact of synergy of guild associations in pharma distribution industry	Collaborative Activities of Guild Associations
C66	Importance of research and development in distribution industry	Importance of R&D

C67+ C68	Impact of customer loyalty on organization profitability+ Impact of customer loyalty on organizational growth	Impact On Growth and Profitability

Table 4 –Axial coding and categorizing the concepts

Categories	Concepts
Quality of Content and Services	Required Content
	Customer's Desired Services
	Systematic Bilateral Interaction
Organizational Readiness	Business Process Reengineering
	Senior Management Support
	Technology Infrastructure
	Employees role
Quality of System and Communication	Direct Communication Channel
	Instant Notification
	Qualitative Features of System
	System Security
Mobile Social Networks	Mobile Social Networks
Customer mobile app	Mobile Systematic features
	Real-time Satisfaction Survey
	Offline Processing
Customer Loyalty	Customer Loyalty
Macroeconomics Policies	Macroeconomics Policies
Microeconomics Policies	Holding's Policies
Health Macro Policies	National Health Macro Policies
Organizational Culture	Contextual Impact of Organizational Culture
National Technical Infrastructure	Technical, Network and Telecommunication Infrastructure
Synergy of Associations and Forums	Collaborative Activities of Guild Associations
	Synergy of Specialist Forums
Business Alliances	Business Alliances and Coalitions
Futurology	Importance of Futurology
	Importance of R&D
Growth and Profitability	Impact On Growth and Profitability
Survive in Competitive Environment	Survive in Competitive Environment
Healthy Competition	Healthy Competition in Health Business
General Health Improvement	Improvement in General Health
Intensifying Competitive Environment	Intensifying Competitive Environment
Social and Economical Context	Social and Economical Context
Conservatism	Tendency to Maintain Current Situation
Enterprise Resources Development	Enterprise Resource Planning
Investment on Emerging Technologies	Companies Investment on New Technologies
Modeling from Competitors	Modeling From Competitors Behavior

Following the grounded theory method, in addition to recognition of Customer Loyalty as the "core category", other categories including "casual conditions", "strategies", "context conditions", "intervening conditions" and "consequences" were recognized. These categories and their interrelationship is illustrated in a diagram named axial coding paradigm which is shown fig 2.

With the selective coding technique of grounded theory and reviewing findings by experts group as we can see on Fig 2, the final list of main factors for increasing customer satisfaction and customer trust and consequently customer loyalty, were recognized as follows:

- Quality of Content and Services
- Organizational Readiness
- Quality of System and Communication
- Customer mobile app

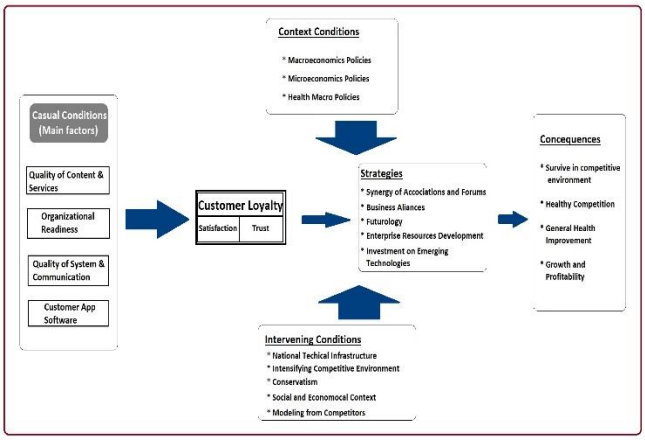


Fig. 2 Axial coding paradigm of research data

In addition, the final list of sub-factors categorized in Table 5.

Table 5 –Final list of main factors and sub-factors

Main Factors	Sub-Factors
Quality of Content and Services	Required Content
	Customer's Desired Services
	Systematic Bilateral Interaction
Organizational Readiness	Business Process Reengineering
	Senior Management Support

	Technology Infrastructure
	Employees role
Quality of System and Communication	Direct Communication Channel
	Instant Notification
	Qualitative Features of System
	System Security
Customer Mobile App	Mobile Systematic features
	Real-time Satisfaction Survey
	Offline Processing

4-2- Interdependencies Between Factors

The content of interview process with experts and next talking to them, showed that there are interrelationships and interdependences between main factors and sub-factors. To evaluate these interdependencies, the Dematel method was applied using paired comparison questionnaire. The results of filled questionnaire by group of expert in Dematel calculations format for main factors are summarized in Table 6.

Table 6. R and J values of main factors

Main Factors	R	J	R+J	R-J
Quality of Content & Services	0.431	1.112	1.543	-0.681
Organizational Readiness	1.385	0.000	1.385	1.385
Quality of System & Communication	0.578	0.648	1.226	-0.07
Customer mobile app	0.537	1.172	1.709	-0.635

Table 6, shows that "organizational readiness" factor has the most impact on other factors and "customer mobile app" has the most impact from other factors. Furthermore, the "customer mobile app" factor has the most interaction with other factors whiles the intensity of "organizational readiness" on other factors is obviously more than others.

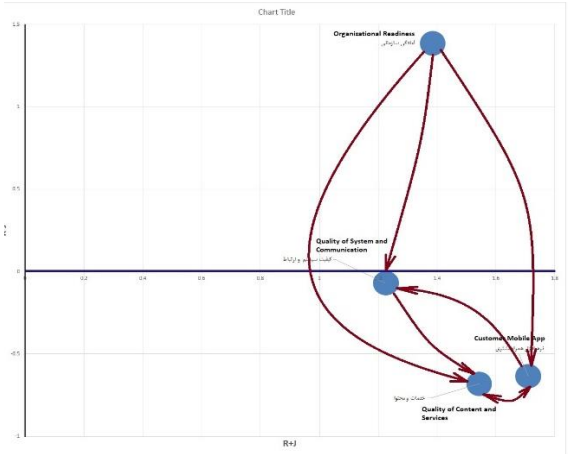


Fig. 3 Cartesian graph of Interdependencies between main factors

Fig 3 is the Cartesian Graph of interdependent relations between main factors based on Dematel method.

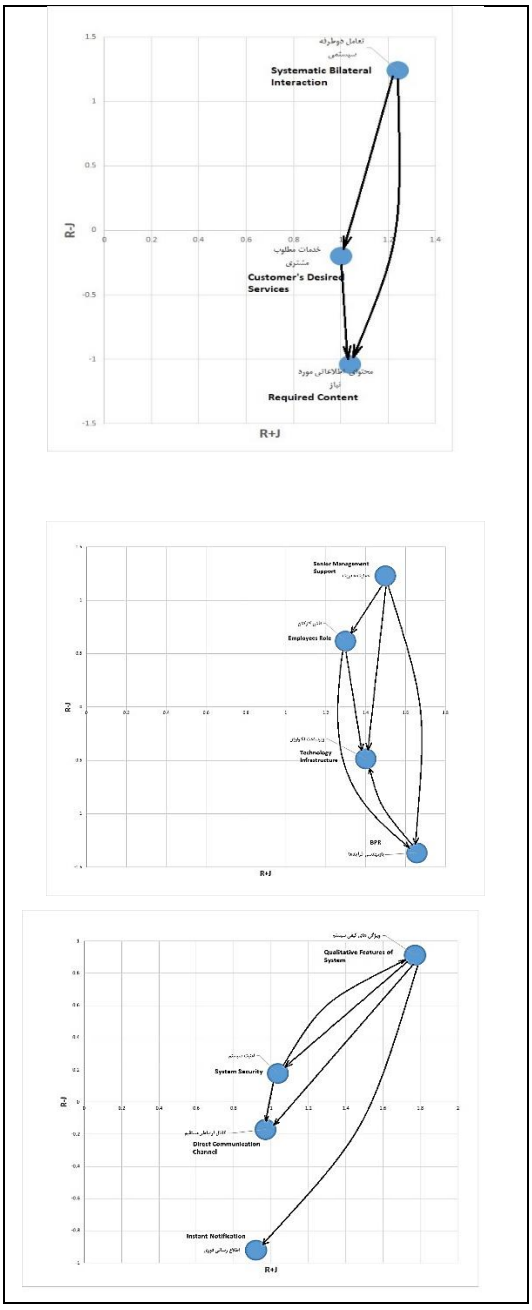
As the same way, the results of Dematel calculations for sub-factors are summarized in Table 7.

Table 7. R and J values of sub-factors

Sub-Factors	R	J	R+J	R-J	Affecting / Affected
Required Content	0	1.04	1.04	-1.04	Affected
Customer's Desired Services	0.4	0.6	1	-0.2	Affected
Systematic Bilateral Interaction	1.24	0	1.24	1.24	Affecting
Business Process Reengineering	0.146	1.511	1.657	-1.365	Affected
Senior Management Support	1.364	0.134	1.498	1.23	Affecting
Technology Infrastructure	0.458	0.942	1.4	-0.484	Affected
Employees role	0.959	0.34	1.299	0.619	Affecting
Direct Communication Channel	0.4	0.571	0.971	-0.171	Affected
Instant Notification	0.92	0	0.92	-0.92	Affected
Qualitative Features of System	1.342	0.429	1.771	0.913	Affecting
System Security	0.607	0.429	1.036	0.178	Affecting

Mobile Systematic Features	1	0	1	1	Affecting
Real-time Satisfaction Survey	0	0.429	0.429	-0.429	Affected
Offline Processing	0	0.571	0.571	-0.571	Affected

Fig 4 illustrates the Cartesian Graph of interdependent relations between sub factors based on Dematel method.



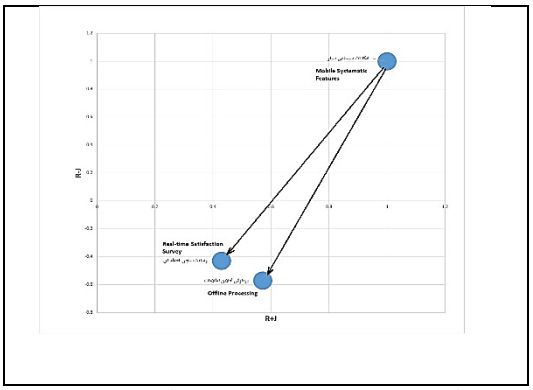


Fig. 4 C. graph of Interdependencies between sub-factors

4-3- Prioritization and Ranking of Factors

After clarifying interdependencies among main and sub-factors, the Analytic Network Process (ANP) was applied to evaluate the priorities of the all factors and to rank them based on their importance in final model. The Analytic Network Process (ANP) is a generalization of the Analytic Hierarchy Process (AHP). Priorities are established in the same way they are in the AHP using pairwise comparisons and judgment. Many problems cannot be structured hierarchically because they involve the interaction and dependence of higher-level elements in a hierarchy on lower-level elements [20]. So the ANP method was used considering the inner and outer interaction and dependence among main factors and sub-factors.

Fig 5 shows the feedback network map of relations between all factors.

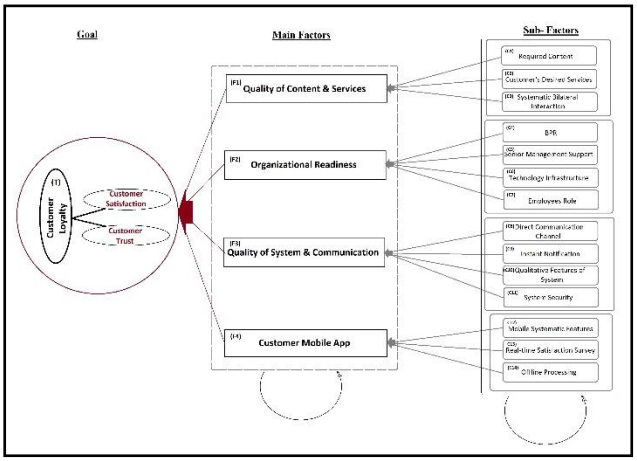


Fig. 5 Network map of relations among factors for ANP analysis

The preliminary data gathered from paired comparison questionnaire firstly was averaged in Excel software then using Super Decision software, the Weighted Super-matrix of all factors was obtained as shown on fig 6.

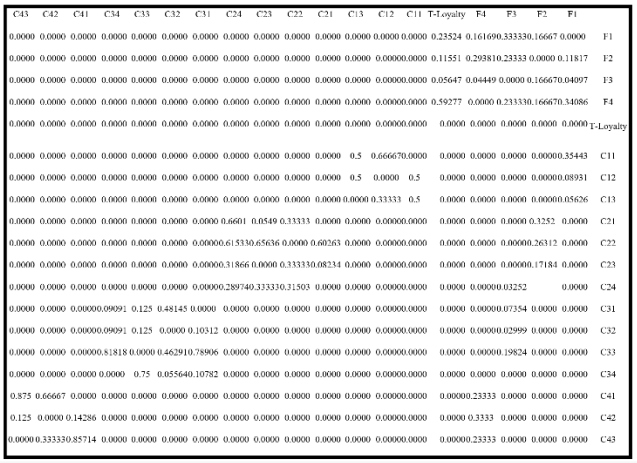


Fig. 6 Weighted Super-matrix of factors

The final results of Super Decision calculations based on ANP analysis are summarized in table 8.

Table 8- Ranking of Main Factors and Sub-Factors

Main Factors	Sub-Factors Code	Sub-Factors Weight	Sub-Factors Ranking	Factors Weight	Facors Ranking
Quality of Content & Services	C11	0.0855	4	0.2176	3
	C12	0.0769	5		
	C13	0.0684	6		
Organizational Readiness	C21	0.0369	11	0.3106	2
	C22	0.0908	3		
	C23	0.0514	9		
	C24	0.0568	7		
Quality of System & Communication	C31	0.0127	13	0.1500	4
	C32	0.0095	14		
	C33	0.0413	10		
	C34	0.0329	12		
Customer Mobile App	C41	0.1981	1	0.3219	1
	C42	0.0517	8		
	C11	0.01871	2		

The above table shows that on the basis of experts' opinion, the "Customer Mobile app" is the most important factor for an effective e-CRM system based on mobile computing technology in pharma distribution industry. Also the importance of "organizational readiness" factor is very close to first factor.

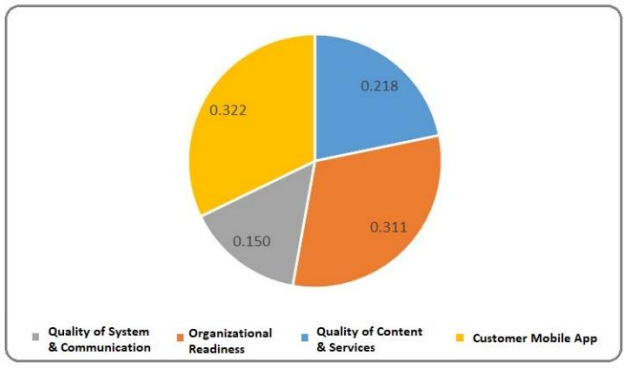


Fig. 7 Weight of main factors in a pie chart

The importance of main factors is illustrated in a pie chart (fig 7) and the importance of sub-factors with their ranking is illustrated in a bar diagram (fig 8).

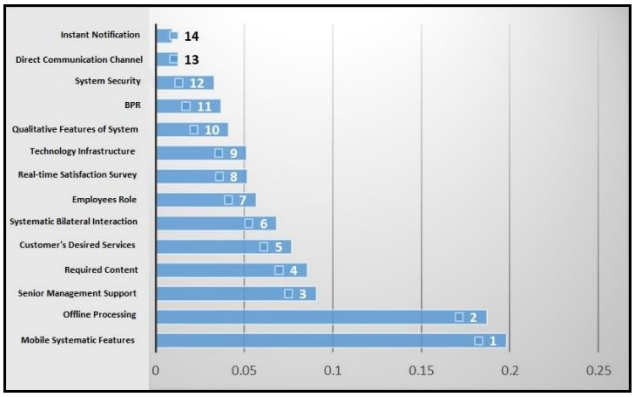


Fig. 8 Weight of sub-factors and their ranking

Fig 8 shows that "mobile systematic features" and "offline processing" are the most important sub-factors based on experts' opinion.

4-4- The Final Model

With extract of all main factors and their importance during research process, the final model for an effective e-CRM system based on mobile computing technology in pharma distribution industry has been designed and proposed as fig 9.

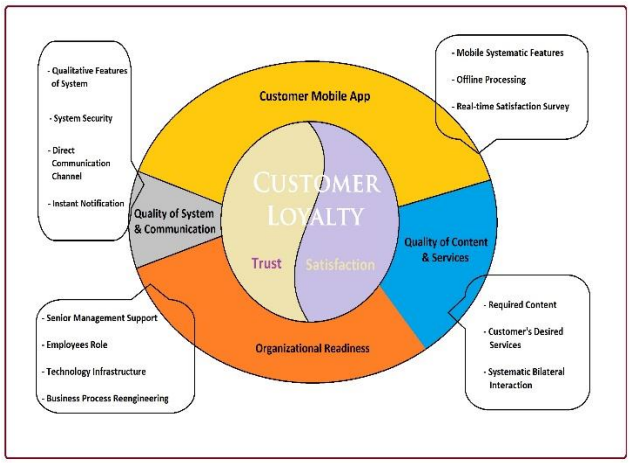


Fig. 9 The final model of research

In the process of proposing the final model, these fundamentals have been considered: Firstly, the positive impacts of implementing e-CRM system on different aspects of organization has been discussed in previous researches. In these researches the organization word refers to a general concept and includes all kind of economic firms in all industries. Whereas the pharma distribution industry in Iran has its own special characteristics such as direct B2B market, large number of customers, wide geographical dispersion, moving sales team, type of customers and special kind of products and also the competition environment has been intensified dramatically between companies in this industry, there is real need for a new technological e-CRM model dedicated to this industry. Secondly, almost in all previous researches we can find the customer loyalty is introduced as the main goal of all CRMs. This was confirmed too by the group of experts in this research which means that an effective new e-CRM model should increase customer loyalty towards the organization. Thirdly, the customer mobile app has discovered as a key factor in this research whilst has not been mentioned in none of previous researches. This is a main factor with highest importance in proposed model which seems is added to this area's body of knowledge and extracted from experts' opinion.

Effective e-CRM system based on mobile computing technology in pharma distribution industry was recognized as follows:

- Quality of Content and Services
- Organizational Readiness
- Quality of System and Communication
- Customer mobile app

5- Conclusion

Reviewing the research process and its findings, shows that the customer loyalty which is rooted to customer' satisfaction and trust is the main goal of customer relationship management. To achieve this, a combination of two areas of knowledge including e-CRM and mobile computing technology can provide a significant capacity. In these days, for pharma distributors which have special organizational characteristics and are doing business under a high competitive pressure, it is very important to acquire this capacity. A suitable model for acquisition this capacity is necessary. These companies can apply the proposed model in this research which is suitable for implementing an e-CRM system combined with mobile computing technology. This model has four key components. Although they have different weighs and importance in the model but all should be considered simultaneously by the companies. For any key component there are several sub-factors to clarify dimensions of related key component and act as guidelines. These four key components are briefly summarized as follows: **a**. A mobile application software that is compatible with mobile devices (Smartphones, Tablets, …) and is affordable to customers with ability to run on customer's smartphone. This application is equipped with offline processing capabilities and provides accessibility to required information for customers wherever and whenever they like. **b**. The type and quality of content, information and services that propose and present to customers via the mentioned application software. **c**. The level of organizational readiness of the pharma distributor company in terms of management, IT infrastructure, processes, resources, etc. for support of services that company wants to give its customers via the mentioned application software. **d**. Qualitative dimensions of whole company's system including the mentioned software application and the quality of its connection to other core systems of the company. This should include the quality of permanent connectivity and high performance of the application software which will be used by customer everywhere and every time.

Research findings indicate that designing and developing a customer-side mobile application has the highest priority for an effective m-CRM system in pharma distribution Industry. Not only this factor but also organizational readiness of the company and other both factors should be considered and invested enough by companies. Accordingly, we suggest the proposed model to those pharma distribution companies willing to have an effective customer relationship management with their customers. We suggest these companies to revise their customer-oriented strategies and establish or modify their CRM approach with mobile computing technology with the help of proposed model. We suggest them to emphasize on developing a customer-side mobile application software coincide with investment on improving level of e-readiness. Continuous improvement of updated content, information, services and facilities that are delivered to

customers and likewise system quality modification are recommended strongly at the next steps.

Additionally, we suggest all companies and business enterprises which are faced with a rising up competitive environment to utilize the findings and results of this research and its proposed model for adoption a modern approach in their CRM structure. The model can be a general guideline for all companies willing to establish an effective e-CRM or m-CRM comprehensive system.

Implementing an e-CRM based on mobile computing technology is an enterprise multi-dimension project that its most important prerequisite is company's e-readiness. Considering the importance of this factor and its effect on the other factors, we suggest all companies interested in mobile-CRM implementation to perform an e-readiness assessment project and evaluate their level of readiness before starting the main project.

Mobile computing technology is expanding rapidly both technologically and applicably. We tried to investigate the role of this technology in customer relationship management specially in pharma distribution. There are many opportunities for further studies to investigate the role of mobile computing technology in other business areas and other industries. The research on applying the proposed model of this research on other type of service-oriented companies is another subject for further studies.

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