

Study the Effect of Different Aspects of Customer Relationship Management (CRM) on Innovation Capabilities with Mediator Role of Knowledge Management (Case Study: Mahram Company)

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Abstract

Research purpose: the purpose of this research is to study the effects of different aspects of customer relationship management (CRM) on innovation capabilities with mediator role of knowledge management variable. Five aspects of customer relationship management are sharing the information, participation with customer, long time cooperation, solving the problems jointly, technology-based customer relationship management and five aspects of innovation capabilities are product innovation, process innovation, administrative and marketing innovation and services, and also with regard to knowledge management role in collecting, keeping and dissemination of knowledge for managers as moderator or mediator variable has been included in the model and developed. Research methodology: for validation of suggested model, 140 questionnaires including 68 items were distributed among the personnel and staff of Mahram factory and also the managers and supervisors and all the retailers of Mahram products in all Iran branches and to investigate the research hypotheses, multiple Regression analysis was applied with using of spss software that direct and indirect effects of independent and mediator variables on dependent ones were measured and also model fitness was assessed by Lizerl software. Findings: with regard to rout analysis and total beta measurement for research variables, it was turned out all aspects of customer relationship management and knowledge management has a positive and meaningful effect on innovation kinds in Mahram Company. Practical implication: with regard to research findings, customers management knowledge which has been collected by customer relationship management tools is one of the most important sources of the company to achieve innovation capabilities and consequently competitive advantage over competitors that this important issue demands special regard of managers to develop the substructures of customer relationship management and knowledge management in the field of technologies so that through it information and knowledge of customers could be used in the best manner and relevant information could be given to them and through holding meetings and seminars and inviting the important and old customers and proposing common problems and cooperation with them, the customers ideas, opinions and designs about organizational innovation improvement, designing and developing new processes and better services and their opinions in products pricing could be used.

Keywords: CRM, knowledge management, customer relationship management

1. Introduction

Innovation is the competition axis and the main key of economic development and nowadays new necessities and demands cause innovation. At the present age despite of technology which is changing and unpredictable markets, producers have to spread their innovation capabilities to meet market demand and customer preferences in order to achieve long time competitive advantage.

Tid et al in 1997 showed that producers with having innovation in higher products and services capabilities could achieve profit two times more than the producers who don't use of innovation. Therefore companies to achieve this important, need to have tools and facilities that with regard to research aspects, customer knowledge management is one of the most important tools of knowledge managers to create new ideas that these managers could combine staff experience and knowledge and information proceeding which have been achieved from customers by using of different aspects of customer relationship management to create innovation. However the organizations which try to strengthen their data bases through participation with customer, could overtake from their competitors in process of their products

and services development and improvement in market, because most products and services are in accordance with market demands and attraction. Therefore knowledge management has been often known as the main source and reference of innovation capabilities and is considered as one of the significant necessities of innovation process in organization.

Therefore this research seeks to answer the following question:

How is the effect of customer relationship management on innovation capabilities in Mahram Company?

2. Theoretical bases

Researchers divide different mechanisms of CRM into internal and external plans. Internal plans emphasizes on organizational culture and structure and knowledge management, while external plans include interactions with customers like sharing the information and participation with customer. This research concentrates on both internal plans that its variable is knowledge management and external plans that its five main variables are sharing the information, participation with customer, long time cooperation, solving the problems jointly and technology-based customer relationship management.

2.1 Knowledge management

Various definitions have been stated for knowledge management and its process by researchers that some samples are mentioned. Knowledge management is known as a struggle for exploring hidden capability in the minds of people and converting this hidden treasure to organizational asset, so that a widespread range of people who are important in company decision making could access to this wealth and use of it. Gupta and Mc Daniel believe knowledge management has two aspects of administrating the knowledge and ability to create new technology (Gupta and Mc Daniel, 2002). The purpose of first aspect is the provision of necessary information of applicants in suitable time and second aspect includes acquisition activities, combination, distribution, application and knowledge creation to improve the organization operations.

Knowledge management is briefly, the art of creating value from invisible or spiritual assets of the organization and in fact it is obvious and systematic management of knowledge and creation processes, collection, organizing, distribution process and related using of them that includes a conscious process of knowledge creation, accreditation of knowledge, knowledge representation, knowledge distribution and its application (Rafati et al, 2008).

Davenport and Perasak believe that knowledge management is exploitation and development of organization knowledge assets in order to achieve the organization purposes. The knowledge which is managed includes both explicit and implicit knowledge. Mike burk believes that knowledge management assists that suitable information could be available for proper persons in order to make decisions correctly.

Knowledge management assists that individuals can communicate with each other and share their knowledge. This case guarantees the organization success in competition arena among other organizations.

Knowledge management enforcement in organization leads the knowledge remains in the organization forever and as a result of the withdrawal of staff from the organization, produced knowledge- with regard to a cost that organization has spent to produce it can not be removed from the organization. Knowledge management purpose is to identify, collect, classify and organize, reserve, share, propagate and make the knowledge accessible in organization level (Mike Burk, 1999).

2.2 Knowledge management processes

The process of knowledge production, creation, acquisition: knowledge creation could be known as the process of new knowledge creation or replacement or reformation of organizational knowledge through social relations and organizational cooperation. This process takes place in individual and organizational levels to create new explicit and implicit knowledge (Alavi and Lidner, 2001).

Knowledge creation is an endless process which includes new opinions creation, new ideas achievement, and separated rules combination to create new processes (Jashapra, 2004).

According to triple model of Nonaka et al (2001) knowledge creation process in organization has different steps and components that through the processes of sociability, internalization, externalization and combination, knowledge is created in explicit and implicit form. Organization knowledge storing facilitate knowledge creation process in organization.

The process of organizational knowledge creation through team work strengthening causes the organization

structure to be leveled and encourages the staff to participate in making decisions. (Meyer and Rouhman).

The process of knowledge organizing, keeping and storing: knowledge organizing in knowledge management cycle refers to storing, recording and keeping knowledge in figures and frameworks which are used again by other staff. In fact knowledge organizing is the prerequisite of knowledge sharing. In other words knowledge registration in intranet and folders prepares the ability for knowledge sharing (Jashapra, 2004).

Documentation term means registration and storing, coding and knowledge classification and useful experiences. Making a part of the human knowledge and awareness written purposely could be known the common aspect of all documentation paces. In some sources, documentation stages have been stated as follows (Jafari Moghaddam, 2002).

- Searching, collecting, confiscating and codifying the documents and deeds collection related to each pace
- The regulation and classification of those deeds and documents from subject and time point of view
- Confirming the plans/performances and determining its differences and mentioning the reasons for disputes and differences.

The process of transferring, sharing and distribution of knowledge: The third step of knowledge management process is to transfer knowledge that during it an organization distributes the information among its members and transfers learning and creates a new knowledge or perception (Sarлак, 2007).

Davenport and Porosak (1998) define the knowledge transferring, both information transferring to the receiver and absorbing and converting it by the information receiver.

When individuals share their knowledge, the knowledge of per person increases through combination of a person's knowledge with others and a new knowledge is obtained (Hedayat Hadaf 1998).

Knowledge sharing is a bilateral proceeding of knowledge and it distributes among individuals and professional and unprofessional bases of knowledge (Conner, 1996). The role of knowledge sharing is so important that some authors state that "knowledge management is for supporting the knowledge sharing" (Huysman & deWit, 2000; Davenport et al, 1998). Some reasons of the importance of knowledge sharing are costs reduction, improvement of performance and services presentation to the customers, reducing development time for new products, reducing the delay time in delivering goods to the customers and eventually reducing the cost which is related to find and access a variety of valuable knowledge inside the organization (Alavi and Lidner, 2001; Skyrme, 2002; Dyer and Nobeoka, 2000).

The process of utilization, application and exploitation of knowledge: the ultimate goal of knowledge management is to apply the knowledge in order to improve the organizational performance. Many experts know this stage as the most important step in knowledge management process because competitive advantage is not only dependent on having rich and full of knowledge sources, but also it depends on applying the knowledge sources in organizational operations and decisions. "When the staff apply their best experiences in new situations to improve their performance, they modify them and achieve a new collection of the best experiences" (Sarлак, 2007).

Application of knowledge refers to knowledge tool which is shared without fanaticism. Unlike someone who is the source of it, this cycle refers to knowledge combination with deed and representation of it in the company services or goods (Kowakman, 2004).

Knowledge assessment: there are different approaches for assessment of knowledge management processes in order to receive the feedback such as measuring the effects of knowledge management on organizational performance, the approach of balanced score card, assessment according to the return rate of capital, assessment based on age cycle (And one, 2009).

2.3 Innovation

Encyclopedia of organizational behavior defines innovation the creation and application of new idea. This new idea may be related to innovation in the field of the technology or work process. The idea may be a new combination of old ideas or a plan which has called into question the current order, offers a new formula or point of view. Far and Vest know the innovation as the introduction and application of new idea and products by individual, group, organization to related unit for modifying and planning in a manner which is useful for individual, group, organization or society.

Amabile defines the organizational innovation, as successful implementation and execution of innovative ideas in the organization. (Mousavi Fahroodi, 2012)

Halt (1998) applied the innovation term in a widespread concept as a process to use of related knowledge and information in order to create or introduce the new and useful affairs. Varking explains that innovation is anything which has been revised, planned and come true and could firm the organization situation against competitors and also it could facilitate a long time competitive preference. In other words innovation is the creation of new thing which follows and executes a certain goal.

Therefore, in general definition, innovation could be defined as any new idea related to an organization, industry, a nation or world. (Khodadad Hosseini, 1999).

2.3.1 *Product innovation*

Development and in introduction of a new product to the market or changing the available products from performance point of view are called the quality or appearance of innovation in product.

2.3.2 *Process innovation*

This term refers to create and improve the production method and applying new elements in organization production process.

Process innovation is related to a production method implementation or a new or much improved delivery which could be in a form of significant changes in methods equipment or software.

Productions methods are techniques, equipment and software which are applied in goods production and services presentation. Equipping the production line with a kind of new automation and designing based on computer for production are some examples of new production methods.

2.3.3 *Marketing innovation*

Market research, set price strategy, market sharing, propogandas affairs, distribution canals and marketing information systems are placed in this subject.

2.3.4 *Administrative innovation*

Administrative innovation is new organizational method implementation in business practices of firms, work place organization or foreign communications. The purposes of organizational innovation are to increase the company performance by decreasing the implementation and exchanges costs, satisfaction improvement in work environment (and therefore work force productivity improvement), accessing to uncommercial properties (like non-codified foreign knowledge) or supplies costs reduction.

The difference between the administrative innovation and bureaucratic changes is that administrative innovation is the implementation of a new administrative method which hasn't been used in the organization before, given that these innovations are the results of organizational decisions which are chosen by managers.

2.3.5 *Services innovation*

The organization commitments in different innovative activities to promote the customer satisfaction are after sale services, keeping method instructions, systems to accept orders and innovation in services. With regard to the specifications of services part, the managers should take into account some considerations to increase their success opportunity. Firstly, we should involve the customers from the beginning and approach such a service modeling as possible. In a study which has been accomplished by Martin and Home (1995) it has been mentioned that direct and increasing participation of customers in general process of development and using of information related to the customer increase the success capabilities in special stages. But although it seems that involving the customer entails great benefits, in Gadrey et al (1994) research it has been referred that at the beginning of 90s, services firms didn't act very effective in settlement and using of networks or involving the innovation process customers.

2.4 *Customer relationship management (CRM)*

It refers to all processes and technologies which are applied in companies and organizations to identify, persuade, spread, keep and present services to customers.

The organizations with using of customer relationship management could shorten the purchase cycle and increase customer loyalty to create closer relations and incomes. The system of customer relationship management could help to keep existing customers and attract new customers. The organizations apply some methods which are customer relationship management, customer value analysis, and organizational strategy and services mechanisms which improve

the customer relations efficiency. Customer relationship management is a strategy to acquire new customers and keep them. Customer relationship management includes the operations such as activities related to direct customers like companies (Barrese et al, 1995, pages 297-308).

Customer relationship management refers to use of widespread and engineering strategies to find, access and train the customers who have advantages, and therefore it helps to keep long time participation (Sean et al, 2005). Aggarwal (1997) and Clay comb et al (1999) have defined customer relationship management as the activities which are used by producers for understanding the customer demands and his satisfaction improvement. Customer-centric approach is a vital factor for success in business. (Joe, 2007) and organization is a director for concentrating on its customers (Ranjan and Bhatangar, 2008). Good strategy of customer relationship management could increase the sale with improvement of relations with customers and consequently customer loyalty could be also increased (Howang and Linn, 2005).

Also researchers classify various CRM mechanisms into internal and external plans. Internal plans emphasize on organization structure, culture and knowledge management, while external plans include interactions with customers (for example sharing the information and customer participation). This study concentrates on CRM external-centric plans and includes five favorite activities of CRM: information sharing, customer involvement, long time cooperation, solving the problems jointly, and CRM based on technology.

Information sharing: Mc Evily and Mrcusin 2005 mentioned that information sharing refers to sharing and exchanging the necessary and unique information through interactive activities between producers and their customers. Shared information is usually the demand in the market, customer preferences, sale promotion and new product introduction (Mentzer et al, 2000).

Participation with customer: interaction with customer is one of the main necessities of potential incomes. Not having this experience or being weak represents missing all or some customers.

The using method of customer partnership which leads to innovation consists of:

1. Feedback receipt from informed persons
2. Activity execution in smaller scales
3. Longitudinal attitude
4. Close feedback loop

Long time cooperation: in turbulent environment with accelerating changes, the institutes has had to change their reaction method to market, so that they could less concentrate on products and more on customers and their relations and instead of short time view take the long view. (Harrison, 2000, 1). Our times companies should emphasize on keeping the present customers and creating long time and profitable relation with them. The main vision of customers keeping is to satisfy the customer permanently through offering superior value to the customers. (Katler, Gray, 2001, 17). Because both organization and customer want to cooperate with each other for a long time, an important and meaningful relation develops between them to establish loyalty and trust. Usually the customers that have a long time relation with the companies with regard to trust and loyalty created, are more willing to cooperate with their pleasant organization and they usually present valuable information to the organizations. And also the organization is more willing to present special services to its old customers.

Solving the problems jointly: the organizational structure, behavior and culture should be changed in a manner that all staff, partners and producers could be in the service of offering value to the customers. This variable refers to cooperation and participation between producers and customers in solving their problems and sharing the responsibilities when they face with difficult and unexpected conditions. (Linn et al, 2012).

Technology based on CRM: information technology progresses have changed research environment on the subject of different aspects and tendencies of marketing and commerce. In this relation, widespread researches have been accomplished all around the world by researchers and the results have been published, Peter and Sidin in 2000 and also Eston and Goud in 2001 accomplished researches about the application of information technology that some results in this field have been achieved such as increasing the speed of informing and providing services, increasing the quantity and quality of production, the possibility of market development, the possibility of needs assessment for presenting new goods and services, preventing from customer tendency to competitor.

2.5 The relation between customer relationship management and knowledge and innovation management

With regard to the importance of customer knowledge management in innovation creation and also with regard to research model for achieving the innovation creation, knowledge proceedings could be identified, managed and lined up.

At first step a data base for using of customers information should be created so that it could be used for

supporting of customers in their purchase cycle. This case is called knowledge support for customers. The knowledge for customers has information about products, markets and suppliers. This aspect of knowledge also influences on customer perception of services quality. At the same time, knowledge from customers should be linked with each other in order to create innovation in services and products, generate ideas and improve the products and services continuously. Conquering the customer knowledge and involving the customers in innovation process could be achieved through different manners. For example the customer knowledge about products, suppliers and market tendencies could be used through suitable feedback mechanism for preparing a systematic improvement and products innovation. Customer knowledge collection and analysis is certainly one of the oldest knowledge management activities in the domain of customer relationship management. In addition to this the raw data of customers and past transactions, knowledge about customer considers current needs of clients, future demands, relation, and also purchase activity and financial capability. Knowledge about customers is collected in the process of support and services of customer relationship management and it is analyzed in the process of customer relationship management analysis. (Seyed Hassan Raja- Jun 2014)

In second step the obligation of senior managers is information sharing and managing the customer knowledge so that the obtained information from the market should be shared among the staff in all levels by necessary tools in order the new knowledge could be crated, distributed and converted to innovative goods and services by this information of new knowledge. Therefore it could be briefly said that for exploitation of information and knowledge to create innovation, knowledge should be identified , created and then managed (sharing in all levels) and third it should become applicable that this case isn't possible unless with having a powerful system of customer relationship management in the organization so that they could collect the information by it . Customer knowledge according to the research hypotheses is identified and collected through different aspects of customer relationship management.

2.6 Conceptual model of research

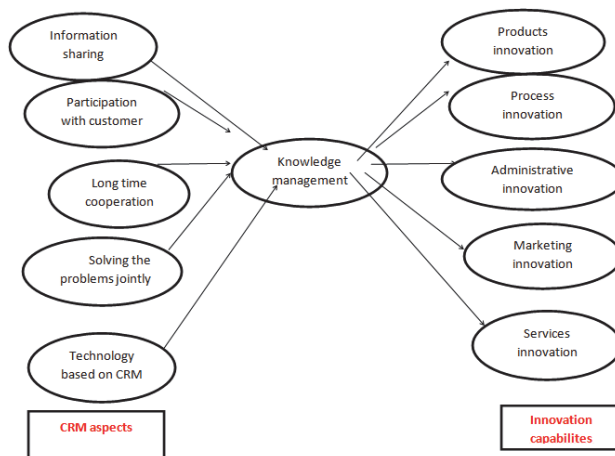


Figure 1: research model

2.7 The research hypotheses

- H_{1a}. Information sharing through knowledge management has a positive effect on product innovation.
- H_{1b}. Information sharing through knowledge management has a positive effect on process innovation.
- H_{1c}. Information sharing through knowledge management has a positive effect on administrative innovation.
- H_{1d}. Information sharing through knowledge management has a positive effect on marketing innovation.
- H_{1e}. Information sharing through knowledge management has a positive effect on services innovation.
- H_{2a}. Participation with customer through knowledge management has a positive effect on product innovation.
- H_{2b}. Participation with customer through knowledge management has a positive effect on process innovation.
- H_{2c}. Participation with customer through knowledge management has a positive effect on administrative innovation.
- H_{2d}. Participation with customer through knowledge management has a positive effect on marketing innovation.

- H_{2e}. Participation with customer through knowledge management has a positive effect on services innovation.
- H_{3a}. Long-time cooperation through knowledge management has a positive effect on product innovation.
- H_{3b}. Long-time cooperation through knowledge management has a positive effect on process innovation.
- H_{3c}. Long-time cooperation through knowledge management has a positive effect on administrative innovation.
- H_{3d}. Long-time cooperation through knowledge management has a positive effect on marketing innovation.
- H_{3e}. Long-time cooperation through knowledge management has a positive effect on services innovation.
- H_{4a}. solving the problems jointly through knowledge management has a positive effect on product innovation.
- H_{4b}. solving the problems jointly through knowledge management has a positive effect on process innovation.
- H_{4c}. solving the problems jointly through knowledge management has a positive effect on administrative innovation.
- H_{4d}. solving the problems jointly through knowledge management has a positive effect on marketing innovation.
- H_{4e}. solving the problems jointly through knowledge management has a positive effect on services innovation.
- H_{5a}. Technology based on CRM through knowledge management has a positive effect on product innovation.
- H_{5b}. Technology based on CRM through knowledge management has a positive effect on process innovation.
- H_{5c}. Technology based on CRM through knowledge management has a positive effect on administrative innovation.
- H_{5d}. Technology based on CRM through knowledge management has a positive effect on marketing innovation.
- H_{5e}. Technology based on CRM through knowledge management has a positive effect on services innovation.

3. Methodology

The method which has been applied in this research is descriptive-gauging and from purpose aspect, it is an applicable research. The statistical society includes army staff of Mahram company and supervisors and employees of Mahram factory in Ghazvin and the sale managers and supervisors of Mahram broadcasting corporation in all branches of Iran which are 600 persons and from among them with using of Morgan table, 150 persons were randomly selected as statistical sample, and questionnaires were distributed among them that 10 questionnaires were eliminated because of being deficient and having problem and 140 questionnaires were used. Data collection has been accomplished with library and field methods. The tool of data collection was questionnaire that three standard questionnaires of knowledge management, customer relationship management and organizational innovation have been used. The content validity of the questionnaires was confirmed with using of specialized and amendatory opinions of thematic professors and experts, and for determining the research tool reliability Kroonbakh alfa test was used that the results have been mentioned in table 3-1:

Table 3-1: Kroonbakh alfa of research variables

Variable	N=140
Long-time participation	0.80
Information sharing	0.706
Customer partnership	0.887
Solving the problems jointly	0.930
Technology-centered CRM	0.902
Product innovation	0.923
Process innovation	0.965
Administrative innovation	0.966
Marketing innovation	0.915
Services innovation	0.730
Knowledge management	0.962

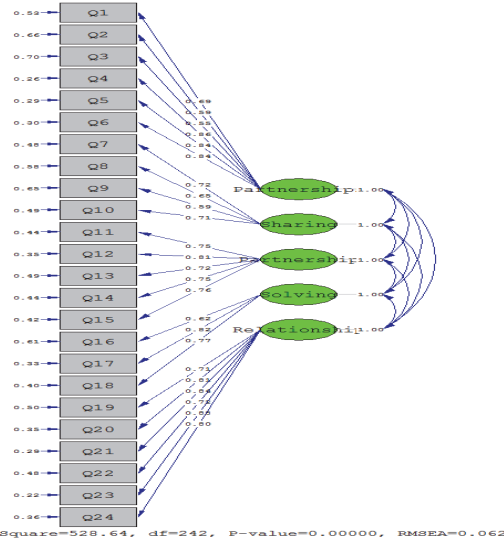
Considering that the calculated reliability for all variables is more than 0.7, it could be said that research tool has a high and suitable reliability.

At the present research in order to do the hypotheses test, factor-confirmatory analysis, structural equations modeling, Regression and correlation methods have been used.

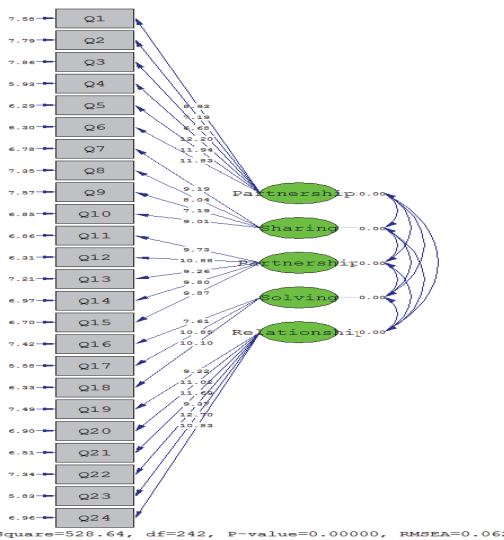
4. Research Findings

4.1 Factor-confirmatory analysis of research variables

Measurement model of customer relationship management: this graphs which have been brought in following part show the model of customer relationship management aspects in standard and meaningfulness forms. As these graphs show, the membership of all considered factors in this variable has been confirmed.

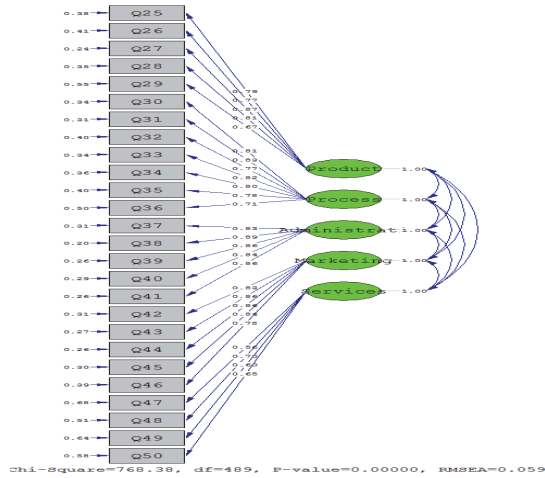


Graph 4-1: the measurement model of customer relationship management aspects with using of factor- analysis in standard form

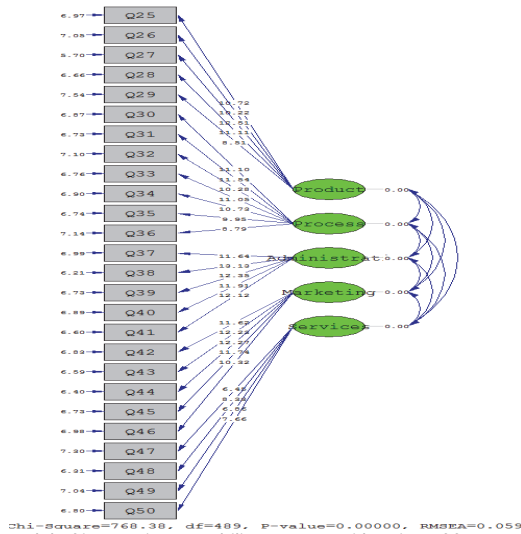


Graph 4-2: the measurement model of customer relationship management aspects with using of factor-analysis in meaningfulness state

The measurement model of innovation capability aspects: following graphs show the model of innovation capability aspects in standard and meaningfulness states. As these graphs show, the membership of all considered factors has been confirmed.

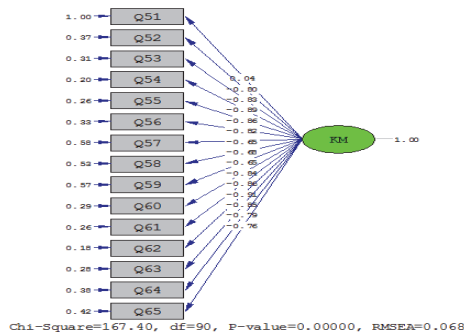


Graph 4-3: The measurement model of innovation capability aspects with using of factor-analysis in standard state

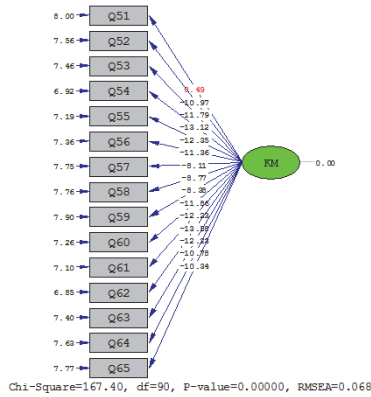


Graph 4-4) the measurement model of innovation capability aspects with using of factor-analysis in meaningfulness state

4.2 The measurement model of knowledge management aspects



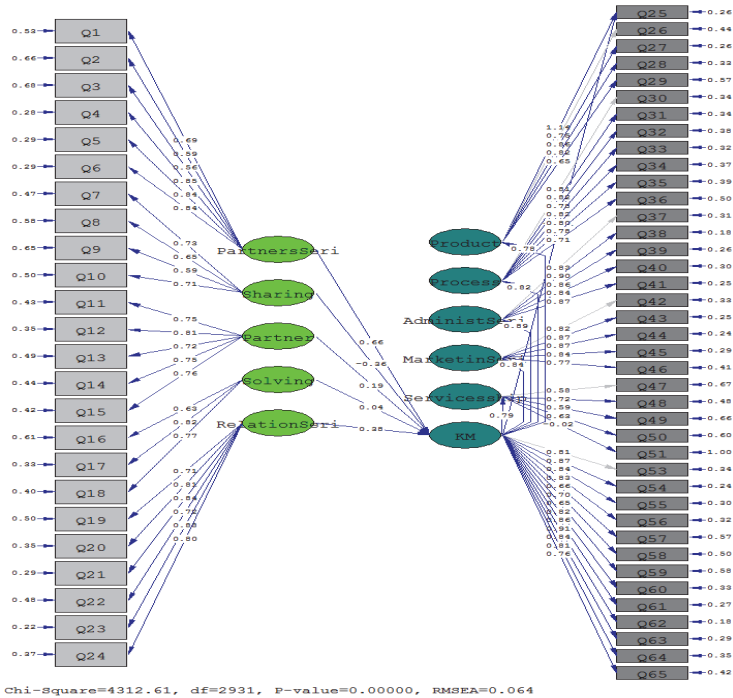
Graph 4-5: The measurement model of knowledge management aspects with using of factor-analysis in standard state



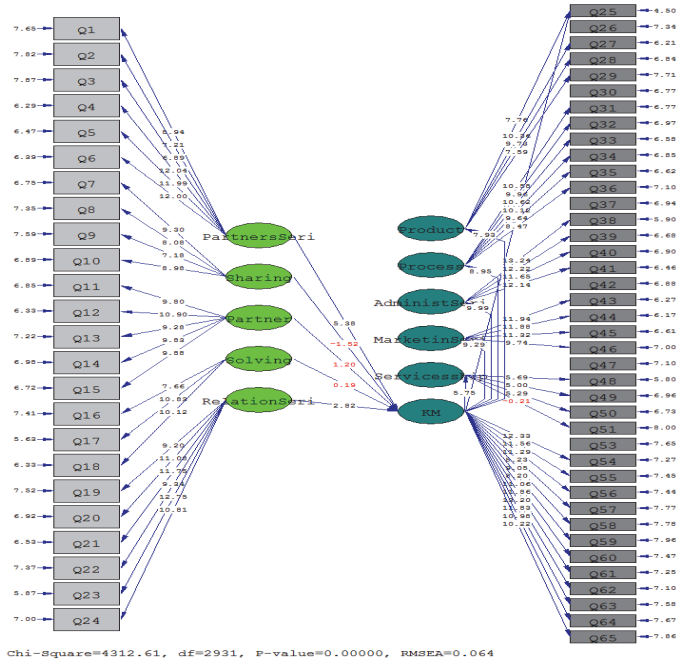
Graph 4-6: The measurement model of knowledge management with using of factor-analysis in meaningfulness state

The previous graphs show the model of knowledge management aspects in standard and meaningfulness states, the membership of all considered factors has been confirmed except question 51.

4.3 The obtained results of statistical analysis



Graph 4-7 the general model measurement and hypotheses results in standard state



Graph 4-8: general model measurement and hypotheses results in meaningfulness state

Table 4-1: Suitability indicators of conceptual model

IFI	NNFI	CFI	GFI	RMR	RMSEA	X2/df
0.96	0.91	0.95	0.97	0.029	0.064	1.47

Two figures and a series of numbers on it are the outputs of Lizerl software.

The existing numbers on the rout state the coefficients of standard rout. The slight Regression coefficients in normalized Regression equation are called rout coefficient which are direct effect of x on y in causal analysis.

T measures show the obtained results of being meaningfulness of each rout or in other words show the meaningfulness of slight Regression coefficients. In trust level of 95% if test statistic (t) is less than 1.96, it will show that rout coefficients aren't meaningful and this rout could be eliminated.

χ^2/df : In structural equations modeling, Kay Square statistic is a traditional method to assess the total value of model. Because the calculated measure of χ^2/df for the structure is equal to 1.47, it indicates that zero hypothesis is confirmed on complete value of model with statistical society data.

GFI and CFI: two suitability indicators (GFI) and modified suitability (AGFI) are known as absolute suitability indicators. The measures of these indicators must be between 0 and 1. The measure more than 0.9 states acceptable suitability of the model. The above calculated measures of GFI and AGFI are equal to 0.97 which shows that the model suitability is acceptable.

Root Mean Square error of Approximation or RMSEA indicator:it is one of the main indicators of suitability goodness in structural equations modeling. According to Mac Kaloum, Brown and Shougavara (1996) point of view if the measure of this indicator is less than 0.1, the model suitability will be so excellent. If it is between 0.1 and 0.5, the model suitability will be good and if it is between 0.5 and 0.8 the model suitability will be intermediate. Considering that the measure of this indicator in final model suitability will be equal to 0.064, we can say that the model suitability is so good.

Suitability indicator (**NNFI**): although its measure is resistant compared with the volume changes of sample group, but because its domain isn't limited to zero and one, its interpretation is more difficult compared with NFI. Based on contract, the measures less than 0.9 need to be revised in the model. Considering that the measure of this indicator in the

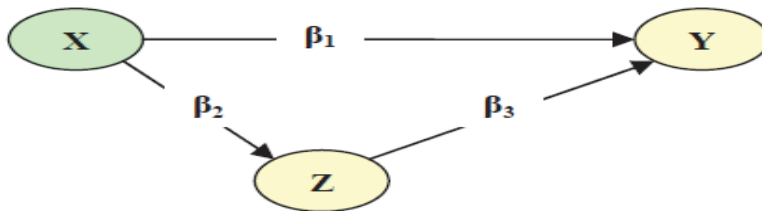
model is equal to 0.91 so the model has a good suitability.

Suitability indicator (IFI): also the measure of IFI according to contract must be at least 0.90 so that considered model could be adopted. Considering that the measures of this indicator in the model is equal to 0.96 so the model has a good suitability.

4.4 Subsidiary hypotheses test with using of Spss

In this part of research multi variables Regression analysis has been accomplished. The analysis purpose is to identify the share and effect of independent and mediator variables in explanation and anticipation of dependent variable changes. To examine the direct and indirect effect with using of spss software and Regression analysis, beta coefficients of independent variables on mediator variable and mediator variable on independent variables and also the effect of independent variable on separated dependent variable were taken.

4.4.1 Direct, indirect and general effects



Direct effect: it states a direct effect of variable **x** on variable **y**. (β)

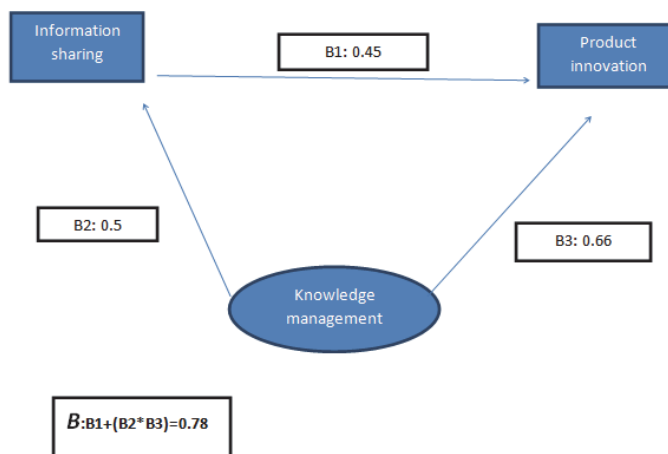
Indirect effect: it is an indirect effect of variable **x** on **y** through another anticipator variable. When **x** is the cause of **z** and also **z** influences on **Y** the relationship between **x** and **Y** is **indirect**.

General effect: direct effect+ indirect effect

Indirect effect: the product of each rout coefficients ($\beta_2 \times \beta_3$)

- ❖ If general effect is calculated less than 0.3, observed correlation will not be meaningful.
- ❖ If general effect is between 0.3 and 0.6, correlation will be suitable.
- ❖ If general effect is more than 0.6, correlation is so suitable.

In following part, direct, indirect and general effects have been marked for first variable:



These stages were enforced for all hypotheses separately which have been brought in following tables to prevent from repetition.

4.4.2 The effect of information sharing on innovation capabilities through knowledge management

Table 4-2: Subsidiary hypotheses test related to information sharing through knowledge management on innovation capabilities

Hypothesis	Standard beta measure					Result
	Direct effect	Indirect effect	General effect	β_2	β_3	
Information sharing through knowledge management has a positive effect on product innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and product innovation	Confirmation
	0.45	0.66*(0.50)	0.78	0.50	0.66	
Information sharing through knowledge management has a positive effect on process innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and process information	Confirmation
	0.60	0.72*(0.50)	0.96	0.50	0.72	
Information sharing through knowledge management has a positive effect on administrative innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and administrative innovation	Confirmation
	0.46	0.79*(0.50)	0.85	0.50	0.79	
Information sharing through knowledge management has a positive effect on marketing innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and marketing innovation	Confirmation
	0.48	0.74*(0.50)	0.85	0.50	0.74	
Information sharing through knowledge management has a positive effect on services innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and services innovation	Confirmation
	0.48	0.62*(0.50)	0.79	0.50	0.62	

According to the table, we see that because total β measure is more than 0.6 in all variables, therefore all subsidiary hypotheses have been confirmed in this part.

4.4.3 The effect of partnership with customer on innovation capabilities through knowledge management

Table 4-3) subsidiary hypotheses test related to partnership with customer through knowledge management on innovation capabilities

Hypothesis	Standard beta measure					Result
	Direct effect	Indirect effect	General effect	β_2	β_3	
Partnership with customer through knowledge management has a positive effect on product innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and product innovation	Confirmation
	0.49	0.66*(0.48)	0.80	0.48	0.66	
Partnership with customer through knowledge management has a positive effect on process innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and process information	Confirmation
	0.63	0.72*(0.48)	0.97	0.48	0.72	
Partnership with customer through knowledge management has a positive effect on administrative innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and administrative innovation	Confirmation
	0.57	0.79*(0.48)	0.95	0.48	0.79	
Partnership with customer through knowledge management has a positive effect on marketing innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and marketing innovation	Confirmation
	0.54	0.74*(0.48)	0.89	0.48	0.74	
Partnership with customer through knowledge management has a positive effect on services innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and services innovation	Confirmation
	0.54	0.62*(0.48)	0.83	0.48	0.62	

According to the table 4-3 we see that because total β measure is more than 0.6 in all variables therefore all subsidiary hypotheses have been confirmed in this part.

4.4.4 The effect of long-time cooperation on innovation capabilities through knowledge management

Table 4-4: subsidiary hypotheses test related to long-time cooperation through knowledge management on innovation capabilities

Hypothesis	Standard beta measure					Result
	Direct effect	Indirect effect	General effect	β_2	β_3	
Long-time cooperation through knowledge management has a positive effect on product innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and product innovation	Confirmation
	0.62	0.66*(0.71)	1.00	0.71	0.66	
Long-time cooperation through knowledge management has a positive effect on process innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and process information	Confirmation
	0.61	0.72*(0.71)	1.12	0.71	0.72	
Long-time cooperation through knowledge management has a positive effect on administrative innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and administrative innovation	Confirmation
	0.65	0.79*(0.71)	1.21	0.71	0.79	
Long-time cooperation through knowledge management has a positive effect on marketing innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and marketing innovation	Confirmation
	0.60	0.74*(0.71)	1.12	0.71	0.74	
Long-time cooperation through knowledge management has a positive effect on services innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and services innovation	Confirmation
	0.58	0.62*(0.71)	1.02	0.71	0.62	

According to the table, we can see that because total β measure is more than 0.6 in all variables, therefore all subsidiary hypotheses in this part have been confirmed.

4.4.5 The effect of solving the problems jointly on innovation capabilities through knowledge management

Table 4-5: Subsidiary hypotheses test related to solve the problems jointly through knowledge management on innovation capabilities

Hypothesis	Standard beta measure					Result
	Direct effect	Indirect effect	General effect	β_2	β_3	
Solving the problems jointly through knowledge management has a positive effect on product innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and product innovation	Confirmation
	0.62	0.66*(0.71)	1.00	0.71	0.66	
Solving the problems jointly through knowledge management has a positive effect on process innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and process information	Confirmation
	0.61	0.72*(0.71)	1.12	0.71	0.72	
Solving the problems jointly through knowledge management has a positive effect on administrative innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and administrative innovation	Confirmation
	0.65	0.79*(0.71)	1.21	0.71	0.79	
Solving the problems jointly through knowledge management has a positive effect on marketing innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and marketing innovation	Confirmation
	0.60	0.74*(0.71)	1.12	0.71	0.74	
Solving the problems jointly through knowledge management has a positive effect on services innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and services innovation	Confirmation
	0.58	0.62*(0.71)	1.02	0.71	0.62	

According to the table, we can see that because total β measure is more than 0.6 in all variables, therefore all subsidiary hypotheses have been confirmed in this part.

4.4.6 The effect of technology based on CRM on innovation capabilities through knowledge management

Table 4-6: Subsidiary hypotheses test related to technology based on CRM through knowledge management on innovation capabilities

Hypothesis	Standard beta measure					Result
	Direct effect	Indirect effect	General effect	β_2	β_3	
Technology based on CRM through knowledge management has a positive effect on product innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and product innovation	Confirmation
	0.62	0.66*(0.71)	1.00	0.71	0.66	
Technology based on CRM through knowledge management has a positive effect on process innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and process information	Confirmation
	0.61	0.72*(0.71)	1.12	0.71	0.72	
Technology based on CRM through knowledge management has a positive effect on administrative innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and administrative innovation	Confirmation
	0.65	0.79*(0.71)	1.21	0.71	0.79	
Technology based on CRM through knowledge management has a positive effect on marketing innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and marketing innovation	Confirmation
	0.60	0.74*(0.71)	1.12	0.71	0.74	
Technology based on CRM through knowledge management has a positive effect on services innovation	Direct effect	Indirect effect	General effect	Participation and KM	KM and services innovation	Confirmation
	0.58	0.62*(0.71)	1.02	0.71	0.62	

According to the table, we can see that because total β measure is more than 0.6 in all variables, therefore all subsidiary hypotheses in this part have been confirmed.

5. Conclusion

The purpose of the present research was to consider the effect of different aspects of customer relationship management (CRM) on innovation capabilities with mediator role of knowledge management in Mahram Company. The research results show that different aspects of customer relationship management namely knowledge sharing, participation with customer, solving the problems jointly and technology based on CRM through knowledge management had a positive and meaningful effect on innovation.

Knowledge management with making the considered knowledge clear has a significant effect on integration process of knowledge. Knowledge management has been so useful in cases that different operations in organization prevent from knowledge relations and circulation, as recording the knowledge and sharing it from a central point lead to increase the quality and facility of information proceeding to the customer and from customer remarkably. Plessis (2007) believes that knowledge management supports innovation, creates new ideas and causes to demonstrate the intellectual power of the organization. Knowledge management strategies could cause to improve the process in organizations directly (Lopez and Sardan, 2011). Also the studies of Henard (2000) showed that knowledge should be distributed all over the organization in order to produce innovation. Better distribution of knowledge or in other words information sharing will increase the possibility of the emergence of innovation. Therefore innovative organizations are more accountable.

Also knowledge management, creation process, storing, organizing and applying knowledge with the purpose of using of the leverage effect of collective wisdom increase and improve the accountability and innovation. Dav et al (1999) showed that customer-oriented producers struggle for strengthening CRM through customer participation in primary stages, in order to offer practicable experience for facilitating the NPD or changing the existing products. Therefore, the producers who receive important information from customers are able to increase their innovation capability through meeting the needs of the target market (Lin et al, 2012).

From Lin et al point of view (2012) solving the problems jointly is considered as an effective key factor for market success. However Litter and Walter in 2003 believed that when customers voluntarily help to solve the problems of product designing or technical process; this case can be easier for producers in order to improve quality and technical process ability.

Also Houwang and Chung in 2008 stated that solving the common problem has influenced on innovation that

generally present progresses related to existing products, processes and services have been introduced in it.

Also various studies have stated the role of information systems and technology in supporting the innovation. For example Dicheh in 2001 suggested that producers should apply information technology (IT) like online data analysis, data searching, customer information systems, and services centers for perception and relation with their customers. Consequently, producers can offer quick reply to customer demand for new product innovation.

6. Practical and Management Suggestions

The results of this research show that customer relationship management (CRM) through knowledge management has effect on innovation capabilities. Mahram Company needs to examine CRM methods with special kinds of their innovation capabilities carefully. According to this, these suggestions could be proposed:

1. It is suggested for information sharing with customers as a valuable source of knowledge, senior management establishes customer knowledge management data base in order to receive knowledge proceeding about customers and from them continually. Information sharing and the methods of solving the common problem also had positive effects on innovation capability. However long-time cooperation influences significantly on development(administrative and marketing) from five kinds of innovation capability. Therefore Mahram Company should more pay attention to long-time cooperation and administrative innovation and marketing to achieve the sources and necessary support.
2. It is suggested that for partnership with customer, when new products and services are produced or modified, Mahram company managers use of customers opinions and suggestions through holding meetings for customers partnership. Considering that food factories such as Mahram company in future years in addition to domestic competitors compete with worldly companies, the effectiveness of each innovation factor should be identified and clarified for managers and then staff with systematic and educational plan.
3. With regard to the role of loyal and main customers of the company to advance the company's goals and assist to solve the problems and considering that customers could be placed in a colleague situation or economic partner, special financial suggestions should be offered to these customers for attracting the attentions and cooperation feeling; or specific work plans should be accomplished to promote cooperation level and even some events should be held in order to appreciate of long-time cooperation.
4. For technology-centered relationship management it is suggested that new software of customer relationship management is established in all branches of country provinces to facilitate the tracking systems and services so that received information could be available for managers in order to analysis and data searching.
5. For innovation improvement in products and services it is suggested that Mahram company managers hold some meetings to use of customers opinions and suggestions when new products are produced, modified or priced out.
6. With regard to the specifications and advantages of organization resource management system or EPR it is suggested that EPR software should be provided and implemented to create administrative and organizational innovations or even process innovation.
7. Also for process innovation it is suggested that timely processing systems or JIT and also new technologies in Nano domains for production process optimization should be used.
8. It is suggested that new technologies and software should be used to evaluate the personnel performance for administrative innovation.
9. For marketing innovation it is suggested that new methods of network advertising like advertising in social networks and websites and fan club should be launched.
10. For innovation in services it is suggested that the online ordering system from internet or direct purchase of factory should be launched for important customers and agencies so that customers could register their order by spending less time and money.
11. Holding the organizational learning courses to increase the relation between staff and organization that eventually it leads to increase the organization knowledge and knowledge management progress in it.
12. Finally to achieve the systematic innovation capabilities and competitive advantage, the company should develop the customer relationship management and it is also suggested to create and develop the customer's knowledgemanagement data base.

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