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ABSTRACT: Integrated product development processes are based on sharing the knowledge between the suppliers and customers, and internal features of the organization could lower the difficulties of designing a new product in the new-product-development project which ultimately results in customers' satisfaction. Although so much attention is paid to the cost and time, the success rate in new projects is still low. Difficulties in designing new products in integrated product development process can lead to high costs and time-consuming processes and postpone the development process. Some studies have suggested a negative relationship between knowledge sharing and product designing difficulties. According to the past studies and using a population of 279 people including managers, employees, and engineers in Saipa Car Making Company a model has been suggested to investigate the relationship between integrated product development process knowledge sharing and customers' satisfaction with new product development as a mediator. Structural Equations Method (SEM) and SPSS software and LISREL were used for this purpose. The results show that there is a significant relationship between the variables in question.

Keywords: Integrated product development process, knowledge sharing, customer's satisfaction.

INTRODUCTION

Passing the industrial revolution and entering the third century now we are in an era, the most important features of which are uncertainty, complexity, globalization, and the fast speed of technology change. Organizational success under this condition, requires dramatic changes in organizational activities, especially in management. The power to grow is not only depended on financial resources anymore. All group works have admitted that for a continuous competitiveness power they must work on the basis of knowledge. Having known that, organizations can use the modern knowledge as a powerful competitive advantage through knowledge allocation. For years competitive advantage was only defined by the production cycle while nowadays regarding the growing speed of technology changes, the ability to produce new products is a competitive advantage which in turn leads to formation of new markets making the beds for new products. This has led to some changes in organizational requirements and demands from production in global markets which are highly competitive only those who can provide the market with new and innovative products in a timely manner are successful. So organizations are required to have the ability to develop their new products quickly and inexpensively which will lead to success for the new product.
So emphasizing on the elite knowledge, managers may prepare the grounds for making rational decisions, using the opportunities, and improving performance on the basis of the knowledge. Therefore, through knowledge management which includes processes like; creating, allocating, documenting, making access to, and using knowledge, one could lay the grounds for using vital resources which builds up the way to the competitive advantage and survival of the organization. As Peter Dracker suggests “the key to success in the 21th century is not knowledge but knowledge management”. Managers then are obligated to prepare an environment in which knowledge can be transferred from people to one another.

**Knowledge management**

In the world we are living in, knowledge is not only a capital but also the most important asset any organization has. Organizations need a new point of view on organizational issues and staff. Keeping and caring about the staff and growing their learning capacity in an organization has a key role in the way to success and gaining competitive advantages. Then just like financial management, knowledge management has to be a part of organizations’ policy.

Dracker believed that knowledge management is basically based on the works by Taylor. During the 19th century economists talked about the difference in worker skills, the subjects of high level and low level skills were then introduced as well as productive and non-productive workers. Although Taylor has not directly mentioned the skill matter, he has mentioned the scientific way to solve problems.

Due to the lack of a systematic stand point towards knowledge management, only 20 percent of the knowledge in an organization is actually in use. Nonetheless succession in organizations is highly dependent on knowledge management while it slightly depends on allocation of physical and financial resources. In other words in the science of economy, knowledge management as a wealth generator, is preferred over assets management.

The most comprehensive definition of knowledge management is: the process of discovering, gaining, generating, maintaining, and using the proper knowledge in the proper time by the proper people in an organization which is conducted through linking human resources, information technology, and communications and building appropriate structure to achieve organizational goals.

**Knowledge allocation**

As the most important resource for any organization knowledge has the property that the higher it is used the richer it gets and the more achievements it brings to the organization. In 1991 Dracker suggested that: knowledge is not a resource just like others namely; work, capital, assets... but is the significant resource of the century. In fact it is the only resource which is not only not lowered by using but also gets more valuable. Based on Nonaka’s opinion: in a world in which the only certainty is uncertainty, the only reliable competitive advantage is knowledge.

It is obvious that organization sustain significant amounts of time and cost for processes like gaining, generating, maintaining, and using knowledge, which in Wig’s opinion is an investment.

All activities involving transferring or distributing the knowledge from one person to another or to the organization or even other organizations are called knowledge allocation. In traditional patterns people were not interested in sharing their knowledge with one another and it was considered as a penetrating tool or a power lever rather than a scientific capital. It was more of a guarantee for the job they had. The organization which supports knowledge allocation and knowledge creation can define more practical and effective processes which in turn will improve organizational performance.

**Product design and development**

Design and development include all the activities involving product design and development. This is a technical process which affects the quality of the products. For this reason, standards have determined requirements for design and development. First steps are to plan design and development in order to measure the steps in which design and development occur, as well as approving any step which is of importance to development and design.

It is beneficial to throw a design in which communications, tasks and task overlaps are clarified.

Design and Development entries include practical and performance requirements of the product, regulative requirements, information from former designs, and other necessary requirements for Design and development. These data should be reviewed for quality, they need to be complete, with no contrary data. The outcome should be so that they prepare the requirements of approval from the data and must be approved before being issued. The outcomes must:

Developed to meet the requirements for entry.
Provide appropriate information for purchasing, production and provision of services. 
Contain acceptance criteria or refer them to their product. 
Determine product features that are essential for the safe and appropriate. 
Following controls are considered in the process of Design and Development to assure the quality of the product. 
Reviewing design and development: in appropriate stages, systematic revision should be considered according to the plans to assess the ability of the outcomes to meet the requirements and recognize any problem and suggest appropriate actions. 
Accepting of design and development: acceptance measures, according to the plans, are to assure that the outcomes meet the requirements of the entries of design and development. 
Approval of design and development: according to the plans this stage is conducted to assure that the product meets the requirements in our mind. 
Design and development change controls: the changes in design and development must be reviewed, accepted, and approved before being conducted. 
After understanding the customer and all their needs, the next stage is product design which is supposed to cover the needs of the customers. This stage follows two basic goals: 
To determine which property in the product brings the highest rate of benefit for the customer. 
To determine what is important to prepare the design properly. 

Knowledge allocation in integrated product development process
The integrated product development team should share their knowledge and understanding about the product. To improve the project performance, in productive organizations the emphasis is on integrated product development process which contains some proper approaches such as simultaneous engineering, customer’s partnership, resource allocation using practical teams… the advantages of integrated product development process are lowering time consumption, lowering costs, improving the quality, effective design and development process, and it is the key to a quick development of a product. To teach the members of integrated product development team, implicit knowledge among them should be shared.

Integrated product development process and knowledge allocation
The first step to develop a product is to create a shared data base of customers, suppliers, and performance requirements. Understanding the process of integrated product development, (i.e. critical actions, key steps, etc.) we can know when and how to gain the knowledge. When learning process is repeated actions and feedbacks happen in every step, this eases the learning process and as a result improves the development performance, namely; cost, time and customer satisfaction. Customer knowledge allocation refers to continuous evaluation of the customer throughout a project and is one of the basic aspects of development goals. Numerous researches have shown that an organization can user its customers to enter the market and extent its knowledge. Knowledge allocation refers to the level of common understanding of engineering, processing, marketing, and production, is applicable on many levels to the members of the integrated product development team. A clear understanding of strengths can help the members of integrated product development team maximize their knowledge resources. Required information on different levels are dependent. Suppliers’ knowledge refers to the common understanding of suppliers’ plans, process and production among the members of production team. According to Sharma and Johansson 1987, considers the relationship between and organization and its suppliers as the most important asset in the organization.
Numerous researches have suggested the positive significant correlation between knowledge allocation in members of production team and customers’ satisfaction and the products’ success. The current study has tried to analyze the role of products’ success and problems in new product designing as a medium the relationship between knowledge allocation in members of production team and customers’ satisfaction. Then the following conceptual model is suggested.
Figure 2-6 conceptual model

METHODOLOGY

Researches are different on the view of their purpose and data gathering methods. From a purpose point of view this study is of a practical kind and from a data-gathering-method point of view it is descriptive and of the survey group. In this paper it is tried to study the relationship between knowledge allocation in members of
production team and customers’ satisfaction with products’ success and design difficulties as mediums in this relationship in Siapa Car Company.

**The population**
Population refers to a group of people having at least one common property. Population is a complete set of possible measures or information about one specific property about which we are trying to be deductive.

In this study, with the purpose of studying the relationship between knowledge allocation in members of the production team and customers’ satisfaction with products’ success and design difficulties as mediums the population consists of all the employees and managers in production line in Siapa Car Company in Tehran, the size of which is 1020 people.

**The sample**
Since due to time consuming and costly processes of asking all the members of the population is not an option a part of the population is chosen as the sample to measure desired subjects. Sample is a subset of the population which helps us get information needed for the research.

**Reliability**
One of the most important properties of any data gathering tool, which is questionnaire for our study, is the reliability. Reliability is a measure of stability and consistency for the concept in question and helps assessing the worthiness of a measurement. Reliability, which is also known as accuracy, refers to the fact that how similar are the results in different times and places.

This concept tries to investigate how similar are the outcomes in similar conditions. One of the tools to measure the reliability is cronbach’s alpha which can be calculated by SPSS software version 18.

To measure the reliability of the questionnaire, 279 questionnaires were distributed among the members of the sample and through analysis of the data gathered by the questionnaire by SPSS software, the cronbach’s alpha was calculated for the questionnaires. Table 1-1 shows the cronbach’s alpha for the questionnaires. Table 1-1 shows the cronbach’s alpha for the questionnaires. It is important to mention that a cronbach’s alpha under 0.6 is poor, 0.7 is acceptable and above 0.8 is good. However, the more reliability coefficients are close, the more reliable the research is. The cronbach’s alpha for the questionnaire in this study were calculated by SPSS software and the value 0.85 show the good reliability of the questionnaire.

According to the cronbach’s alpha questionnaires are reliable

<table>
<thead>
<tr>
<th>cronbach’s alpha</th>
<th>Number of questions</th>
<th>questions</th>
<th>variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.81</td>
<td>9</td>
<td>1 to 9</td>
<td>Knowledge allocation in development process</td>
</tr>
<tr>
<td>0.72</td>
<td>6</td>
<td>10 to 15</td>
<td>New products success</td>
</tr>
<tr>
<td>0.76</td>
<td>6</td>
<td>21 to 16</td>
<td>New products difficulties</td>
</tr>
<tr>
<td>0.75</td>
<td>4</td>
<td>25 to 22</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>0.85</td>
<td>25</td>
<td>25 to 1</td>
<td>Development process</td>
</tr>
</tbody>
</table>

**ANALYSIS METHOD**
To analyze the data SPSS software and LISREL software (both statistical software) were used. Confirmatory Factor Analysis is also used in this study to confirm the rating scale. To analyze the data and the hypotheses, and to answer the questions of interest, inferential and descriptive statistics were used. To study the relationship between knowledge allocation in members of production team and customers’ satisfaction Structural Equation and path analysis were used.

**Hypotheses**
In this part of the study we try to investigate the hypotheses. For this purpose first the level by which variables are represented by the questions is measured for which Confirmatory Factor Analysis is used. Then to
investigate the level of relationship between each pair of the variables and the significance level of the study structural equations are used.

**Confirmatory Factor Analysis**

To investigate the validity of the variables in question (the level by which variables are represented by the questions) Confirmatory Factor Analysis is used. Confirmatory Factor Analysis is a theoretical model in which the researcher starts the research with hypothesis set before.

This model is based on a powerful theoretical and practical foundation which determines which variables are correlated to which factors (questions). So the factors for each variable are investigated in the following part.

In Confirmatory Factor Analysis first we have to confirm the fact that the data can be used for analysis. In other words is the size of the data (sample size and the relationship between the variables) appropriate? In this direction KMO index and Bartlet test are used.

**KMO METHOD**

An index of sampling qualification which investigates the smallness of the relationship between the variables just to determine whether or not variances on the study are due to variances of basic and latent variances of some factors. Using this method the researcher can make sure that the data are suitable for Confirmatory Factor Analysis. KMO’s value is between 0 and 1. If the KMO is under 0.5 the data are not suitable for Confirmatory Factor Analysis and if it is between 0.5-0.69 Confirmatory Factor Analysis can be used cautiously. If the value is bigger than 0.7 existing correlations are appropriate for Confirmatory Factor Analysis.

**BARTLET METHOD**

This test determines the time when the correlation matrix is mathematically an identity matrix and is then not suitable for Confirmatory Factor Analysis. Correlation matrix can have to states:

First, when the correlation matrix is an identity matrix which shows that there is no significant relationship between the variables so there is no possibility of finding new factors according the correlation between the variables.

Second, when the correlation matrix is not an identity matrix which shows that there is a significant relationship between the variables so there is a possibility of finding new factors according the correlation between the variables. If significance level (Sig) in Bartlet test is less than 5 percent, Confirmatory Factor Analysis is appropriate to identify the factor model because the assumption of the correlation matrix being of an identity kind is rejected.

<table>
<thead>
<tr>
<th>Rate</th>
<th>variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.68</td>
<td>KMO</td>
</tr>
<tr>
<td>36</td>
<td>Degrees of freedom</td>
</tr>
<tr>
<td>0.00</td>
<td>Significance level of Bartlet</td>
</tr>
</tbody>
</table>

KMO and significance level of Bartlet test show that Confirmatory Factor Analysis is applicable.

**Assessing appropriateness and fitness of the model**

After modeling and determining the parameters, the first question is that is the model appropriate? To answer this question the only way is to investigate the fitness. By fitness we are referring to the degree by which a model is consistent with the associated data.

To determine the fitness, covariance matrixes are compared for the population (according to the model which is determined by the researcher)and the sample. We can say that the model fits some data only if implied covariance matrix in the model equals the covariance matrix of the data. In other words residuals matrix and its elements must be zero.

When a model is developed and the properties are determined to meet the requirements of similarity and the test is applicable, to investigate the goodness of the study or the fact that whether or not data are consistence with the model, some indexes are used which can be found in LISREL software. The most important outcomes of LISREL software are provided in table 1-3.
Table 3. fitness of the model

<table>
<thead>
<tr>
<th>Statistic Model 2 (secondary hypotheses)</th>
<th>Statistic Model 1 ((main hypotheses)</th>
<th>Acceptance criteria</th>
<th>Goodness of fit index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6</td>
<td>1.7</td>
<td>$\chi^2 / df \leq 3$ (Chi square) $\chi^2$</td>
<td></td>
</tr>
<tr>
<td>0.035</td>
<td>0.040</td>
<td>RMSEA $\leq 0.08$</td>
<td>RMSEA $^2$</td>
</tr>
<tr>
<td>0.96</td>
<td>0.95</td>
<td>NFI $\geq 0.90$</td>
<td>NFI $^3$</td>
</tr>
<tr>
<td>1.00</td>
<td>0.99</td>
<td>CFI $\geq 0.95$</td>
<td>CFI $^4$</td>
</tr>
<tr>
<td>0.92</td>
<td>0.92</td>
<td>GFI $\geq 0.90$</td>
<td>GFI $^4$</td>
</tr>
<tr>
<td>0.87</td>
<td>0.86</td>
<td>AGFI $\geq 0.85$</td>
<td>AGFI $^5$</td>
</tr>
</tbody>
</table>

Fitness indexes show that the fitness is appropriate in both models. One thing to know about fitness model is that it does approve the structural model nevertheless it never proves that this is the only valid model.

THE RESULTS OF TESTING THE MAIN HYPOTHESES OF THE STUDY

Main hypotheses of this study consists of 5 hypotheses which investigate some factors and in summation they investigate all the factors in question.

Hypothesis 1: there is a significant relationship between knowledge allocation in development process and product success.

H0: there is a significant relationship between knowledge allocation in development process and product success.

H1: there is not a significant relationship between knowledge allocation in development process and product success.

According to the figure above, the standardized coefficient between the variable is 0.65. The significance level for these variables is 6.33 (more than 1.96) which shows that there is a significant relationship. Then hypothesis H0 is approved and we can conclude that there is a significant relationship between knowledge allocation in development process and product success.

Hypothesis 2: there is a significant relationship between knowledge allocation in development process and new product designing difficulties.

H0: there is a significant relationship between knowledge allocation in development process and new product designing difficulties.

H1: there is not a significant relationship between knowledge allocation in development process and new product designing difficulties.

According to the figure above, the standardized coefficient between the variable is 0.46. The significance level for these variables is 6.77 (more than 1.96) which shows that there is a significant relationship. Then hypothesis H0 is approved and we can conclude that there is a significant relationship between knowledge allocation in development process and new product designing difficulties.

Hypothesis 3: there is a significant relationship between knowledge allocation in development process and customer satisfaction.

H0: there is a significant relationship between knowledge allocation in development process and customer satisfaction.

H1: there is not a significant relationship between knowledge allocation in development process and customer satisfaction.

According to the figure above, the standardized coefficient between the variable is 0.61. The significance level for these variables is 8.43 (more than 1.96) which shows that there is a significant relationship. Then hypothesis H0 is approved and we can conclude that there is a significant relationship between knowledge allocation in development process and customer satisfaction.

Hypothesis 4: there is a significant relationship between new product’s success and customer satisfaction.

H0: there is a significant relationship between new product’s success and customer satisfaction.

H1: there is not a significant relationship between new product’s success and customer satisfaction.

$^2$Root Mean Squareror of Approximation
$^3$Normed Fit Index
$^4$Comparative Fit Index
$^5$Goodness of Fit Index
$^6$Adjusted Goodness of Fit Index
According to the figure above, the standardized coefficient between the variable is 0.59. The significance level for these variables is 7.6 (more than 1.96) which shows that there is a significant relationship. Then hypothesis H0 is approved and we can conclude that there is a significant relationship between new product's success and customer satisfaction.

Hypothesis 5: there is a significant relationship between new product designing difficulties and new product's success. 
H0: there is a significant relationship between new product designing difficulties and new product's success.
H1: there is no significant relationship between new product designing difficulties and new product's success.

According to the figures 1-2 and 1-3 above, the standardized coefficient between the variable is 0.62. The significance level for these variables is 8.48 (more than 1.96) which shows that there is a significant relationship. Then hypothesis H0 is approved and we can conclude that there is a significant relationship between new product designing difficulties and new product's success.

Hypothesis 6: there is a significant relationship between knowledge allocation and new product's success.
H0: there is a significant relationship between knowledge allocation and new product's success.
H1: there is not a significant relationship between knowledge allocation and new product's success.

According to the figures 1-2 and 1-3 above, the standardized coefficient between the variable is 0.68. The significance level for these variables is 6.31 (more than 1.96) which shows that there is a significant relationship. Then hypothesis H0 is approved and we can conclude that there is a significant relationship between knowledge allocation and new product's success.
Figure 1. Model 1 (main hypotheses); the relationship between main manifest variables and latent variables (four some)
Figure 2. A magnified part of fig 1; standardized coefficients between latent variables.
Figure 3: Significance between the latent variables
Figure 4. model 2 (Secondary hypotheses): the relationship between latent and variables and general variable of the study
As you can see in the figure above standard coefficients for main variables of knowledge allocation, new product’s success, new product development difficulties, and customer satisfaction are 0.26, 0.37, 0.36, and 0.32 respectively. So the highest effect rate is associated with new product’s success, difficulties, customer satisfaction, and knowledge allocation respectively. According to the fact that significance level for all the variables is more than 1.96 it can be concluded that the results are significant.

RESULT AND DISCUSSION

All the organizations who are seeking sustainable growth must turn knowledge management to a routine. For knowledge management to be successful in an organization, instead of trying to change the culture managers must try to first coordinate knowledge allocation practices with cultural values of the organization and then inform the staff of the great importance of knowledge allocation. The role of knowledge allocation in knowledge management is so important that some authors say that knowledge management is there to support knowledge allocation.

New products, provide the company with growth opportunity and competitive advantages. Nowadays, survival of an organization is in the trend toward new products and using new methods to produce new products. With the growth in technology, growing rate of competitiveness of the organizations, emergence of new sciences and equipment, and dramatic changes in customers’ needs and taste has challenged production of new products. Due to the risks of producing new products, organizations must rethink the improvement of new product development processes and their success. In this direction the current study is an effort to understand the way staff in an organization can share their knowledge to reach the main goal which is customer satisfaction.
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