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# A structural equation modelling to investigate and analyze the relationships among new product development, disruptive innovation, fuzzy-front end, knowledge management, and team vision

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**A B S T R A C T**

The purpose of conducting this research is to establish a conceptual model to improve the performance of new product development in organizations regarding variables of disruptive innovation, team vision, knowledge management, and fuzzy-front end. In this research, the structural equation modelling (SEM) is used to study the model. Also, the explanatory and confirmatory factor analysis are used to extract dimensions of fuzzy-front end and disruptive innovation variables. Research data have been gathered from 109 experts of development and research department of Iran Khodro manufacturing company. The results of research show that disruptive innovation may have very impressive effects on new product development performance. Also, team approach has direct effect on fuzzy-front end. On the other hand, knowledge management has a key role in new product development and organizations can increase the efficiency of new product development by managing their knowledge and sharing them and guarantee the organization success.



## 1. Introduction

New product development is one of the most important and the most essential activities for every organization to survive and grow. In order to compete in domestic and foreign markets, most firms have to develop new products to grow and reach their final goals (Millson, 2013; Alegre et al., 2013). New product development is a lifeline for development of international organizations, which helps organizations gain competitive advantage, attract new customers, and keep current customers (Chandra & Neelankavil, 2008; Herstatt & Verworn, 2001). It seems that market success for new product could be stated as success for an organization and influence on various items such as income, sales figures, market share, etc. (Millson, 2013). Different contexts such as marketing, producing, organizational, and engineering play essential role in new product development (Kang & Kim, 2010). This is because researchers and managers consistently look for techniques and activities for new product development to improve the status of organization and jobs in market (Valle & Vázquez-Bustelo, 2009).

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Different processes have been introduced for new product development used for all the new product development projects in organization. Of course, there is a lack of balance between detailed data about what should be accomplished and how it is planned (Williams et al., 2007; Zhang Hanpeng & Yongbo, 2011; Cooper & Kleinschmidt, 1986; Tzokas et al., 2004). But, the whole process of new product development, which was useful for most of the organizations was presented by Varela and Benito (2005). This process is begun by first observations of idea and then it is continued with quantitative and qualitative analysis and finally it is ended in production and trading. Researchers have used different factors associated with success and efficiency of new product development evaluation. First, researchers look for a way to combine financial and non-financial indices and determine a suitable index.

Researchers like Cooper and Kleinschmidt (1987) detected three dimensions of efficiency and success of new product development, which include, financial indices, effectiveness indices of market. This is mentions to the priority of product to rivals and advantage that product has and rivals cannot present and an expression called "*Opportunity window*". On the other hand, a combination of various qualitative and quantitative scales was determined regarding product, market, technology, and innovation: 1) the efficiency of the market 2) the efficiency of the product 3) efficiency and progress of the project (Verona, 1999; Olson et al., 1995; Yung-Lung Laia & Linb, 2012). Other researchers like Iwu (2010) identified five dimensions associated with profitability of organization and were in association with efficiency of new product development such as product quality, product costs, etc. One of the variables analysed in structural equation modelling in this research, is efficiency and performance of new product development. Regarding mentioned items and varieties of efficiency and performance indices of new product development, and regarding the fact that the primary objective is to use the whole but exact indices, factors which were used by Cooper and Kleinschmidt (1987) and Dayan and Basarir (2009), will be used as performance indices in present research.

On the other hand, innovation is a process that helps organizations become more effective by the use of effective group work and multi-operational teams based on domestic and foreign wide communications (Sundström & Zika-Viktorsson, 2009). One of the first educational definitions of innovation refers to economist called Schumpeter who presented this definition: "innovation is presenting new facilities for usage" (Schumpeter, 2013). Innovation includes development, producing and trading market through different creativities to meet customers' needs (Calantone et al., 2010). The whole process of new product development is an innovative-centred process (Sundström & Zika-Viktorsson, 2009). One of the categories of innovation that researcher paid less attention and nowadays has been discussed more by researchers and managers, is *disruptive innovation*. The concept of disruptive innovation was presented by Christensen for the first time (Christiansen, 1997). There are two reasons that why organizations widely look for disruptive innovation. The first and the most important reason is that these innovations destructs the existing market so that they can identify new market. The second is that organizations have less skill in disruptive innovation and they attempt to increase their knowledge in this context.

Chistensen and Raynor (2003) discriminated between two types of disruptive innovation that included new market and middle to low market. The purpose of low-level market is to obtain the least profit of customers and includes the final value of supplement. Such innovation does not create new market but concentrates on constructing and profitability of the first models of job that includes Amazon and Jet Blue in selling airfare and allows customers to choose the minimum cost. On the other hand, disruptive innovation of new market, focuses on the part of the market that there was no customer before and market has to be established. An example of this innovation is Tablet product. In fact, this product presented new facilities, which customers never experienced it before (Iyer et al., 2006). But, Fuzzy-front end for management and control of new and innovative ideas is a necessity for products (Williams et al., 2007). Fuzzy-front end was first presented by Smith (Smith & Reinertsen, 1991), it is reckoned as the first step in the process of new product development, and it includes activities such as generating idea to confirmation or refusal of that idea. New product development with high rate of failure is often

due to the lack of enough attention in fuzzy-front end phase. According to Backman et al. (2007), key opportunities for success in product development is hidden in first steps of new product development process. Researchers such as Moenaert et al. (1995) stated that in process of pre-processing, organization makes the product concept and identifies whether the idea worth investment or not. Other researchers such as Kim and Wilemon (2002) spotted this word such as endogenous and exogenous uncertainty. Also, factors such as complexity and variability were accepted by researchers. Regarding all the aspects and research done by researchers, four main dimensions about fuzzy-front end were introduced: lack of confidence, ambiguity, complexity, and variability. In this research, complexity dimension is paid attention.

But knowledge management is a field of management that considers the process of knowledge and its creation including information, technology, and innovation. Knowledge management as a field is associated with five other fields including, technology management, production data management, information management systems, and decision-making systems (Madeira et al., 2013). Although Kamasak Bulutlar (2010) explained that using knowledge alone is not enough and effective but correct management is important. There are two important aspects of knowledge managements, which includes knowledge dissemination and knowledge storage. Dissemination and transferring knowledge includes a process that spreads explicit and implicit knowledge in organization through official and non-official networks in order to apply knowledge simpler. Knowledge storage systems refers to systems and processes to store and manage knowledge. These systems include Information Technology process for supporting and operating knowledge and information.

But, the role of manpower is essential. In new product development process, the primary focus is on gathering multi-functional teams. All the members of the team from different departments should do all the affairs harmoniously and consider all the effective factors on product life cycle. According to Lynna and Akgünb (2001) and Lynn et al. (1999), project approach and vision can result in new product development success if they are determined among team members clearly. But, different definitions about team vision were presented by researchers. Kotter (1995) identified vision as a word that lightens the way. Similarly, Crawford and Di Benedetto (2008) identified vision as the direction of team movement, goals, and achievements. Three elements make the team vision; it should be clear, it should matches the project goals with organizational strategies, and finally it should indicate the whole organizational strategy in an understandable way.

Regarding the mentioned materials, the importance of new product development is the main focus of this research. According to investigations accomplished, it was determined that factors such as knowledge management, disruptive innovation, team vision, and fuzzy-front end may influence on performance of new product development. Thus, investigation of a model have been in mind in order to evaluate these factors. In second section, the review of literature and hypothesis associated with relationships between variables will be investigated. Then, in third section, research method and required instruments for analysis will be explained. In forth section, the results of research will be discussed and finally, in further suggestions, a selection of suggestions that can be used in future research will be explained.

## 2. Review of Literature, conceptual model and Hypothesis

In previous section, it was seen that each of indicated variables in this research was very extensive and it was attempted to mention only parts of discussion that were related to this research and brief explanations were presented. On the other hand, investigation of literature review and the relationship between variables with each other based on presented conceptual model is important in research. Thus, in the following section, the research conceptual model was analysed based on literature review and null hypothesis for research is presented. As it is seen in Fig. 1, research conceptual model that presents relationship between variables, is shown in Fig. 1.

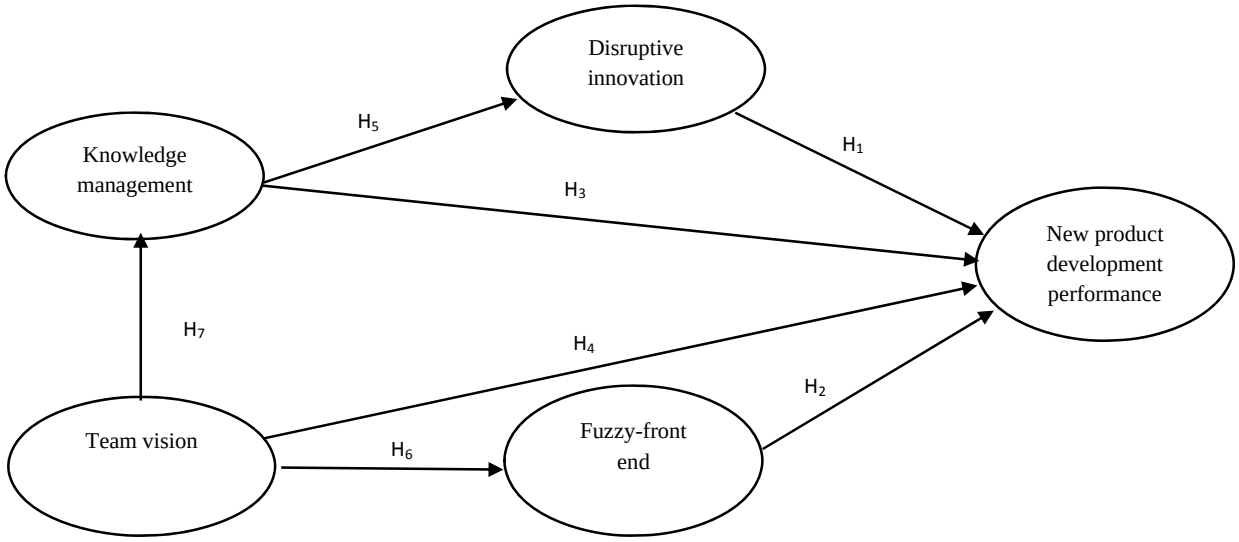


**Fig. 1.** Research conceptual model

*2.1 The effect of disruptive innovation on new product development performance*

Since there is a close relationship between new product development and innovation and most parts are overlapped with each other, their relationship is important and it can influence on the performance of new product development. Veryzer (1998) evaluated and analyzed eight new product development projects related to discontinuous innovation in his research and determined important effective factors in it. The results of the study indicated that discontinuous innovation was managed differently from continuous innovation in new product development. Yang and Liu (2006) showed the relationship of this factor with financial efficiency of organizations in new product development by analyzing different effects of innovation implication in high-tech organizations. Findings of this research showed that spreading innovation can have positive effects on financial efficiency and organization's presence in competition. In other research, Hansen (2006) who used statistical methods, showed that innovation in various phases could have different effects. On the other hand, in research that was accomplished in 2010, Calatone et al. (2010) evaluated the effect of five main dimensions of innovation including market, technology, customer, rivals orientation, and organizational structures on innovation success in new product development as hypothesis. In that research, there was no discrimination between continuous innovation and radicals. Oke and Idiagbon-Oke (2010) showed there is a positive relationship between domestic and foreign relations of organization with development time. But, results indicated a negative relationship between analyzability of innovation and new product development time activities. Millson (2013) in his research proved if there is innovation in duration of new product development, it can have positive and direct effect on its product marketing. As it was seen, previous researches only considered the effect of this variable on new product development and the considerable point here is innovation variable as a whole and disruptive innovation was not considered as a variable for analyzing. Hypothesis is identified in this way:

$H_1$= There is no positive and effective relationship between disruptive innovation and new product development performance.

*2.2 The effect of Fuzzy-front end on new product development performance*

Researchers such as Khurana and Rosenthal (1998) and Carbone et al. (2012) obviously mentioned that the real key to new product development success was hidden in efficiency of Fuzzy-front end activities. Analyzing studies accomplished by researchers about relations of two variables of new product development performance and Fuzzy-front end show the importance of this matter. One of the studies has paid much attention to relationship between Fuzzy-front end factors and new product development, (Zhang & Doll, 2001). The structural of the model that was evidenced in this research, has shown the

relationship between Fuzzy-front end activities, organizational elements, team viewpoint, and finally new product development success. The considerable point here is that this model is presented only as conceptual mode. In 2004, Langerak et al. (2004) conducted a research in which a model was tested in order to explore the relationships between market orientations, profit in activities before development, new product performance, and organizational efficiency. The results showed that market orientations and profit in activities before development were very important. Williams et al. (2007) classified Fuzzy-front end activities and new product development to subsets and activities so that he could operate strategies in a best way. One of the most important and relevant studies accomplished in this matter is Verworn's research (Verworn, 2009). This research was investigated the Fuzzy-front end dimensions on new product development project performance. Dimensions, which were discussed for Fuzzy-front end in that research included, market uncertainty, technology uncertainty, idea selection, and preliminary planning. Results showed that as the technology risk decreases, project efficiency will be improved. But, relationship between marketing risk decrease and project efficiency in this research was not proved. Effectiveness and efficiency are only improved by decreasing technology uncertainty and in fact, decreasing market uncertainty did not influence on performance and it was opposite of research hypothesis. Hou et al. (2011) analyzed the effectiveness and efficiency of Fuzzy-front end process regarding different dimensions. In 2011, researchers in an article analyzed the relationship between variables of Fuzzy-front end, effectiveness, and performance of new product development so that they can determine factors of success in this matter (Cao et al., 2011). Results of this research showed that if market and technology uncertainty decrease, performance of new product development increases. Indicated researches showed the importance of relationship between Fuzzy-front end factor and new product development performance. Since Fuzzy-front end has different dimensions, the complexity dimension will be discussed. Thus, the second hypothesis will be:

$H_2$= There is no positive and effective relationship between Fuzzy-front end and performance of new product development.

*2.3 The effect of knowledge management on new product development performance*

As a whole, Hoegl and Schulze (2005) found four models to create knowledge in organization that can be in line with new product development process. These models include, socialization, extraction, combination, and introversion. Liu et al. (2004) presented a conceptual model in which the effect of knowledge management methods on new product development performance regarding new product development strategies were evaluated. Hoegl and Schulze (2005) discussed only about the concepts related to knowledge management and new product development. One of the most important studies accomplished in this matter was analyzing organization structures, knowledge management methods, and new product development performance in Zhengfeng's research (Zhengfeng et al., 2007). Liu and Tsai (2007) analyzed the effect of knowledge management capabilities and knowledge share mechanisms on efficiency of new product development. Regarding previous findings, it can be said that knowledge management is an important factor that can influence on performance of new product development. Thus, the third hypothesis will be:

$H_3$= There is no positive and effective relationship between knowledge management and performance of new product development

*2.4 The effect of team vision on performance of new product development*

One of the areas of new product development is associated with team member's focus on learning and attempting to transfer knowledge. Many studies showed relationship between this factor and new product development performance (Meyers & Wilemon, 1989; McKee, 1992; Akgu et al., 2002). One of the studies in this matter that refers to a special factor about teams working, was accomplished by Dayan and Basarir (2009). Revilla and Rodríguez (2011) paid attention to relationship between team vision and new product development and mentioned to knowledge strategies as a mediator variable. Results showed that effectiveness of team vision depends on knowledge management strategies in

organization and if these two have conformity with each other, it can result in increasing efficiency of new product development. In other studies, the focus was on importance of clear vision among team members so that they can decrease variety and conflict in roles and guarantee success in project. Results showed that team vision in combination with organizational structures, learning culture, and mutual trust, have positive effect on performance of new product development. Thus, the following hypothesis will be:

$H_4$= There is no positive and effective relationship between team vision and performance of new product development

*2.5 The effect of knowledge management on disruptive innovation*

Many studies have suggested the importance of knowledge management in order to support innovation and considering the fact that innovation and knowledge have close relationships with each other. Huang and Li (2009) evaluated the relationship between knowledge acquisition and application with technical and applicable factors of innovation. The result of research proved this relationship. Also, increasing organizational cooperation can result in improving usage of knowledge management and operating them. In continue, Liao and Wu (2009) analyzed the relationship between knowledge management, organizational learning, and organizational innovation by presenting a statistical model. Liao and Wu (2010) showed that there was a positive and meaningful relationship between organizational innovation and knowledge management and it is in line with Davenport's research. As it was seen, relationship between efficiency of innovation and knowledge management was noticeable. But, innovation includes various models and scales that was analyzed in previous section. In previous research, innovation generally was spotted through its efficiency and choosing a special kind of it like disruptive innovation was not considered. Also, investigating the effect of knowledge management on efficiency of innovation depends on special dimensions of knowledge management and as it was said, knowledge management has vaerious dimensions and some of them were discussed in this research. Thus, fifth hypothesis will be:

$H_5$= There is no positive and effective relationship between knowledge management and disruptive innovation.

*2.6 The effect of team vision on knowledge management and fuzzy-front end*

It is likely that a structured and intended team in organization can create, store, and share knowledge by using its internal structure. Xuw et al. (201) discussed about the relationship between team visions in new product development projects regarding knowledge management and discussed about the relationship between team climate and its effectiveness method on knowledge share. Results of researches showed different aspects of team such as truthfulness, innovative-centered, and correlation dimensions, could meaningfully influence on knowledge share and indicates deep concept of knowledge in working teams.

On the other hand, in 2012, Turner et al. (2012) indicated that team and its active members could include a subset of knowledge management. Although explanation of concepts only was discussed, team approaches, knowledge management, and their overlap were noticeable. Sarin and McDermott (2003) showed that team learnings had strong effect on innovation and team knowledge learning. Therefore, the following hypotheses are presented:

$H_6$= There is no positive and effective relationship between team vision and Fuzzy front end.

$H_7$= There is no positive and effective relationship between team vision and knowledge management.

## 3. Research Method

As said before, the subject that is discussed in this research is to establish a model of structural equation modelling to investigate the relationship between variables of disruptive innovation, Fuzzy-front end,

knowledge management, team vision, and performance of new product development. In this section, it is attempted to explain the research method and discuss the details.

### *3.1 Data Gathering*

New product development is a process, which is conducted in "research and development department" in every industries. But the importance of this process is highlighted in automobile industry. So we considered the statistical population of our research from Iran khodro organization which is an automobile producer company in Middle East. Considering the point that in research and development department of organization, manpower in different parts including employee, expert, master, manager, and deputy are working and the population in research should have specific features such as high education, being related to research, related specialization, and presence in new product development projects, statistical population is the following: deputies and masters who have at least 2 years job experience in research and development department and have connected in new product development projects in organization. Regarding the condition of statistical population in research, only 115 people from the whole population were eligible. Considering Cochran formula, the required number of statistical sampling was estimated 89 people in project. Regarding similar researches and omitting incomplete questionnaires, 109 questionnaires were used.

In this research, data gathering was done through questionnaire and experimental method. In order to gather data for each variable, questions were designed and edited. In the first part of questionnaire, only general information such as job title, gender, background, and education were evaluated. In second part, the main questions were designed to evaluate project variables. This questionnaire was designed according to partial scale 5 Likert in which respondents express their agreement from very low to very high. The performance of new product development variable was discussed with 6 questions, disruptive innovation was discussed with 8 questions, Fuzzy-front end was discussed with 6 questions, team vision was discussed with 9 questions and knowledge management was discussed with 7 questions. At first, in order to assure structure and questionnaires, 15 samples among statistical population were gathered. Then, considering being significant in reliability and validity, 109 questionnaires were distributed. The conceptual model of research was operated in Iran Khodro Production Company. Iran Khodro Company is the largest machine-making production company in Iran and Middle East and it could gain a good share in market rather than its rivals and moreover, allocated the half of Iran's market share to itself. Also, it can present many projects by having the largest new product development unit in order to improve new product. Therefore, regarding the mentioned points, we tested our hypothesis in new product development unit of Iran Khodro Company.

### *3.2 Analyzing Data*

#### *3.2.1 Demographic information*

Investigating demographic information has shown that 33% of research participants were in design unit, 13% in production unit, 8% in financial unit, 24% in technical and engineering unit, and 22% in process and experimental unit. On the other hand, 63% of participants were expert, and about 21% were in deputy part. Finally, 16% were manager. Besides, 57% were men and 43% were women. Results showed that 29% had experience between 2 and 5 years, 33% between 5 and 10, and 38% more than 10. Analysis of data showed that 65% had Bachelor degree and 35% had Master degree. Validity related to variables of performance in new product development, disruptive innovation, Fuzzy-front end, team vision, and knowledge management equals to 0.891, 0.934, 0.947, 0.960, and 0.914. Also, in order to analyze the validity of questions and questionnaire, two methods of content validity and construct validity were used.

#### *3.2.2. Factor analysis*

In construct validity, the explanatory factor analysis and confirmatory factor analysis were used to extract related dimensions of variables of disruptive innovation and Fuzzy-front end.

*Disruptive Innovation:* High value of KMO test that equals to 0.914 for disruptive innovation variable showed that samples were adequate for modelling. On the other hand, significant value of Bartlett test was less than 0.05 and it showed correlated variables for disruptive innovation variable. By doing explanatory factor analysis, the number of factors which determine the whole variance for this variable is presented. Through literature, it was determined that disruptive innovation has three dimensions of market, technology, and other factors. After using explanatory factor analysis, it was determined that only one factor has the ability of expressing variance. As a result, in final model, only one factor called *technology-centered market* was discussed that has ability of expressing 66.467% variable.

*Fuzzy-front end*: High value of KMO test that equals to 0.880 for Fuzzy-front end variable showed that samples are enough for modelling. On the other hand, significant value of Bartlett test was less than 0.05 and it showed correlated variables for Fuzzy-front end variable. By doing explanatory factor analysis, the number of determining factors of variance for this variable is presented. Through literature, it was determined that Fuzzy-front end had two dimensions of decreasing complexity of market and technology. After doing explanatory factor analysis, dimensions of this variable were confirmed and they have ability to express variance of 91.187%.

### *3.2.3 Analyzing Structural Model*

In this section, the model of research which is analyzed in AMOS is presented. Then, parameters of model are estimated by Maximum likelihood Method. Finally, indices of Fit index for model are analyzed. By considering unsuitable indices, the model is adjusted, and correlation of errors are made to improve model indices. After adjusting model, factor loading are reported. Structural model research is presented in Fig. 2 as follows,

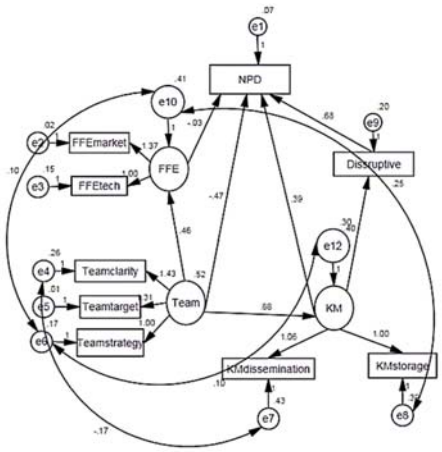


**Fig. 2.** Structural model

Fit indices are classified into different categories. According to classification, fit indices of adjusted model are presented in Table 1.

**Table 1**
Indices of fit model

| Indices | Value | Indices | Value | Indices | Value |
|---|---|---|---|---|---|
| CMIN | 20.867 | TLI(NNFI) | 0.89 | PRATIO | 0.5 |
| GFI | 0.922 | NFI | 0.925 | PNFI | 0.576 |
| AGFI | 0.725 | CFI | 0.942 | PCFI | 0.51 |
| RMSR | 0.051 | RFI | 0.85 | PGFI | 0.523 |
| CMIN/DF | 2.57 | IFI | 0.943 | RMSEA | 0.042 |

As this table shows, most of comparative fit indices have acceptable value. In order to assure structural model, confirmatory factor analysis is used. In fit indices, Chi-square indices, Goodness of fit (GFI),

Adjusted Goodness of fit (AGFI), and root mean square residual (RMSR) are used. In comparative fit indices, normalized fit indices, Bentler Bonett, comparative fit (CFI), relative fit (RF), and Incremental fit (IFI) are used. Finally, Parsimonious normalized fit (PFNI), Parsimonious comparative (PCFI), Parsimonious fit (PGFI) and root mean square error approximation (RMSEA) are used. The estimation that is obtained after model adjustment by using AMOS software, is presented in Table 2. In first column, paths are shown. The next columns shows non-standard regression estimations, standard error, and critical ratio and P value. P symbol shows significant paths. As it is presented in this table, all the critical ratios are higher than 1.96 except 2 paths: Fuzzy front end and new product development that critical path ratio equals to 0.763 and team vision path on new product development that critical ratio equals to -5.628. On the other hand, all the paths except mentioned paths have acceptable P value.

**Table 2**
Regressive factor estimation in standard and nonstandard for research model

| Path | | | Estimate | C.R. | P | Standard Regression Weight |
|---|---|---|---|---|---|---|
| KM | < - - | Team | 0.885 | 9.069 | *** | 0.761 |
| FFE | < - - | Team | 0.460 | 5.341 | *** | 0.460 |
| Disruptive | < - - | KM | 0.396 | 6.358 | *** | 0.600 |
| NPD | < - - | FFE | -0.34 | -0.763 | 0.446 | -0.046 |
| NPD | < - - | Disruptive | 0.678 | 10.051 | *** | 0.698 |
| NPD | < - - | Team | -0.475 | -5.658 | 0.265 | -0.637 |
| NPD | < - - | KM | 0.390 | 4.404 | *** | 0.608 |

## 4. Conclusion

New product development is a process in which human and knowledge play important role and being up-to-date guarantees the success and survival of companies in competitive market. Also, exact realization of new product development process and its effective factors may help organizations gain more confidence to gain perfection and guarantee success. As it was mentioned, the purpose of this research was to establish a structural model to investigate the effects of some variable such as disruptive innovation, Fuzzy-front end, knowledge management, and team vision on the performance of new product development. One of the variables, which was considered in this research and was taken into account was the disruptive innovation. As it was mentioned in second section, innovation has been one of the competitive advantages of every organization and it can help organizations keep themselves in market and improve. The results of studying data confirmed the relationship between disruptive innovation and performance of new product development. By confirming this relationship, it can be concluded that organizations should design their strategies in a way that they encourage employees to be creative and use their creativity in organization. Also it results in increasing the organization's profit and sell. In addition, the presence of innovation team and effective in new products development projects can assist organization in competitive environment. Regarding the review of literature and comparison of previous research, it can be said that the findings of this research are in line with previous research such as (Millson, 2013; Calantone et al., 2010; Veryzer, 1998; Yang & Liu, 2006; Hansen, 2006). Also, after realizing various ideas by organization, choosing the best ideas, and use it for producing better products are so important. Fuzzy-front end can play this role well. Results of analyzing data of model is insignificant. Although it was shown in previous research that decreasing uncertainty in Fuzzy-front end can guarantee the success of performance in new product development but results of the research showed that by decreasing complexity in Fuzzy-front end which is one of the factors of this variable and includes two dimensions of technology and market, the performance of new product development cannot be increased. In other words, there is no significant relationship between these variables. Another achievement gained in this research was that the path between two variables of knowledge management and performance of new product development was significant. Knowledge management has processes and clear activities to explore and determine knowledge and its suitable choice for usage. Whatever is important for new product development, is knowledge acquisition from inside and outside of organization. Gathering knowledge about market, technology, customer needs

and different aspects that effect on product development, influences on knowledge that organization attracts and keeps effectively. On the other hand, knowledge dissemination factor helps organization distribute all the stored knowledge amongst organization members, working teams, and employees. As a result, if organization can be effective in its knowledge management, it can present its products successfully and decrease the risk of new product development.

In addition, Team vision that indicates the importance of development team member's approach through goals and strategies, is noticeable in new product development. According to hypothesis of research, team vision can influence on performance of new product development. Although previous researches showed that group and team activities of new product development members could increase efficiency and performance of new product development by cooperating with each other, the present research rejected this hypothesis. According to Table 4, critical ratio value with negative value indicates insignificance path. It means that there is no significant relationship between team approach and efficiency of new product development. Although previous research did not discuss about the relationship of these two factors and discussed about other team factors such as confidence, honesty and cooperation. In previous section, it was mentioned that knowledge management and innovation gap were two important factors and their relationships with variable of new product development efficiency is noticeable. The relationship between these two factors is also noticeable. Research results showed that these two factors had significant relationship. It means that managing structures of knowledge such as its storage and dissemination can result in promoting innovation gap and help presenting product. According to these results, organizations should use their acquired knowledge to promote innovation and attempt to make relationship between managing structures of knowledge and its innovation. Although results of data showed that team vision can effect on Fuzzy-front end. It means that if goals and strategies of organization for presenting new product is understood by working team members, it can help choosing suitable ideas for new products. The results of research showed that paying attention to team structures and presenting patterns to employees in order to understand the goals of new product development projects, can help choosing the best idea for development and at last improve development process and increase the profit after selling products. In addition, team approach can influence on knowledge management. Structural teams can play role in classification, detection, understanding, and knowledge storage. Achievements of this research can assist organizations especially in production department because exact detection of effective factors in process of production, presenting products, and marketing guarantees organization success in profitability

## 5. Further Suggestions

One of suggestions about this matter includes conducting research in production environment except machine making in which new product development activities are done such as food industry, electrical, etc. Using phase scale instead of Likert scale in order to choose more choices for participants, using other methods in order to prove relationships such as data envelopment analysis, multi-goals decision-making and etc. and presenting solutions to increase new product development success regarding effective variables.

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