



Relationship of the KM process in accordance with the Jasper model with the components influencing the development of new products (Case study: Leading companies in the oil industry)

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Abstract:

Knowledge management is a comprehensive and comprehensive approach to the organization and will lead to the achievement of the effectiveness of the organization. Today, knowledge management has become increasingly important as the most important competitive advantage of organizations. Hence, successful implementation of knowledge management process can affect the performance of organizations. According to theoretical and theoretical issues, knowledge management is considered as factors influencing the development of new products.

The existence of these connections in the theoretical discussions led to the study of the relationship between the dimensions of the knowledge management process (production and acquisition of knowledge, the storage and organization of knowledge, sharing and dissemination of knowledge and the use of knowledge) with the components affecting the development of new products. For this research, a three-part questionnaire (demographic information, effective factors on the development of new products and knowledge management process questions), which was confirmed by experts, was used. And 97 employees of an organization were selected as the statistical sample and responded to the questionnaire questions. The results of data analysis showed that knowledge management dimensions have a positive and significant effect on the components affecting the development of new products.

Keywords: knowledge management, development of new products, the petroleum industry, idea generation, idea selection



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Introduction:

The ever-increasing development of information technology has led to changes in the global economic system that have increased the importance of focusing on knowledge (Chattopadhyay, 2007). These changes made today, in the digital age, information to play a key role in the success of organizations. Also, knowledge is the most valuable form of information. It is necessary for this knowledge to be properly managed in order to make the organization a sustainable competitive advantage for itself (Politis, 2001).

On the other hand, the configuration structure and the type of product architecture play a significant role in the success of the construction, production and supply strategies, so that in most cases, and in different parts of the world, as well as in most industries, this type of configuration and product architecture are. The shaping of production lines and corporate branches are adjacent to industrial and technological suppliers and suppliers (Whitney, 2004).

In many researches, architecture and product development are mentioned as a factor for gaining competitive advantage (Jung et al, 2012).

The product development process is a process that transforms a market opportunity and a set of assumptions about product technology into a marketable product. In addition to developing a competitive position of the firm in the market and enhancing its performance, this process will create new industries, define new standards, as well as develop the market (Vlrrite, 1992).

In a general look at product development, there are six stages: Product Design, Conceptual Development, Product Architecture, Detail Design, Testing, Startup and Production Development (Ulrich, 2012).

Product development is the result of the integration and integration of the two types of cooperation among the stakeholders in a parent company (Oswink & Morgan, 1999).

Today, the process of developing new products in the hands of marketers who were aware of the needs and demands of consumers. The customer demanded and pushed the product into the development process. The development of a new modern product combines these two trends in a "dual drive" approach to innovation.



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Companies know that innovation is a complex process that requires careful and profound investment in research and development, as well as a prominent marketing specialist focused on satisfying consumers and meeting their needs and needs.

Developing a successful strategy for virtualization and integration of information technology, such as most projects, requires time, planning, purchasing and implementation. But a bunch of challenges relate to the fact that you integrate your IT architecture substantially by integrating databases.

The importance of studying the effect of knowledge management process on the factors affecting the development of new products is important, which can enhance organizational performance. Therefore, this research has been tried After explaining the theoretical foundations regarding the knowledge management variables and the development of new products, the extent and the relationship between these variables are examined with the four dimensions of the process of knowledge management (knowledge generation, storage, organization, exchange and sharing of knowledge and the use of knowledge).

Literature review:

Jaspera Knowledge Management Process:

Researchers have identified many aspects of the knowledge management process that can be used to create, use, transfer, acquire, develop, identify, share, exploit, and keep knowledge (Spender, 1996).

In recent years, several scholars have stated that there are four broad dimensions of knowledge management in the process: knowledge production and acquisition, knowledge storage and organization, knowledge transfer, and the use of knowledge (Park, 2006).

Joshara also describes knowledge management as a four-step process: effective learning process along with knowledge generation, knowledge organization, knowledge sharing, and knowledge utilization, which improves organizational performance (Gold et al, 2001).



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knowledge creation

Creating and producing knowledge is an endless process that involves creating and recognizing new ideas and patterns, combining distinct rules of each other, and creating new processes to create knowledge creation (Sharifzadeh, 1998).

Knowledge organization

This step refers to recording, storing and keeping knowledge in a framework that preserves the continuity of its components and is capable of being retrieved and used by employees.

As a prerequisite for the exchange of knowledge. In other words, storing and recording knowledge in the form of intranets, folders, and binders provides the ability to transfer knowledge.

Knowledge sharing:

Knowledge sharing is a two-way mechanism for moving and disseminating knowledge between individuals and knowledge bases mechanized and unmanaged. In fact, 90% of the success of knowledge management depends on the correct exchange of knowledge and the sharing of knowledge from one person to another is a major component of the knowledge management cycle. Which requires the establishment of a knowledge sharing culture of power (Nazari, 2003).

The use of knowledge:

The use of knowledge points to the fact that the knowledge gained, if useful, is used without orientation as to who has presented them. This process involves combining knowledge with practice, applying knowledge and reflection in the organization's services (Rading, 2004). In this regard, Danport declared in 1998 that effective use of knowledge could increase productivity and reduce costs (Kwakman, 2008).

Architecture and product development

Product architecture as one of the components of the product strategy plays a decisive role in formulating and integrating product strategy strategies, operations, and the supply chain of an enterprise while developing a new product.

The structure of the architecture and the type of product architecture play a significant role in the success of the construction, production and supply strategies, and in many studies of product architecture and development as a factor for gaining competitive advantage (Yung et al., 2012).



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In a general look at product development, there are six stages: Product Design, Conceptual Development, Product Architecture, Detail Design, Testing, Startup and Production Development (Ulrich, 2012).

Product development is the result of the integration and integration of the two types of cooperation among the stakeholders in a parent company (Oswink & Morgan, 1999). The variability of competitive laws in the business world has made the process of delivering a new product to the market a very important one.

Most organizations today, more than ever, have found that it is not enough to rely solely on traditional competitive leverage, such as increasing quality, reducing costs, and differentiating between delivering products and services.

Instead, concepts such as speed and flexibility have been found to be significant in competition, and the tendency towards offering new products and services to their markets is justified by this change of attitude.

In a survey of about 700 American firms in 1981, the results indicate that about one-third of the profits of these organizations were due to new products that they have provided, while this survey was in the 1970s. , It was one fifth. Considering the above, the management of the new product development process also requires the use of new managerial approaches. The rugby racing approach, in which the hard work, the forward and rebound of the ball game at the same time as the victory cipher speed, is one of the approaches that will lead to better results.

Honda and Canon are among the companies that have used such a model as a reference model for the development of their new products. The key factors for success are the subsets of the factors that Cooper (1999) has identified as key factors in the success of the new product development process:



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- Appropriate orientation in the market, attention to the market, product orientation and customer-centeredness;
- Focusing on providing a world-class product, having an international orientation in the processes of development, development and marketing;
- Attention to predevelopment activities means training the process of product development and preparing the preconditions for development before the main project of the product development key;
- The rapid definition of the project and the product; this rapid definition is the criterion of victory or failure.
- Delivering and timely delivery of the product on the market;
- Attention to proper organizational structure, design and organizational climate;
- The importance of continuing top management support not only as a guarantee of success in the development process but also as a contribution to the new product development project.

The concept of product architecture was first introduced in 1975 by gentlemen Aperenesis and Atterbeck. This concept has been respected by many researchers in the years to come and developed in product systems. Ericch calls the product architecture a plan for assigning the functional tasks of the product to its physical components, in which the task elements of the product are depicted in the form of physical elements. These components interact with each other through common standard levels. The product architecture includes information on the number of elements of a product, how these elements interact with each other, how they are assembled together, how to use the product and, finally, how to assemble the product (Ulrich, 2012).

In summary, the product architecture is a comprehensive description of the product characteristics class, including the number and type of components, the number and type of shared levels existing among these components, as well as the basic structure of the product (Fixon, 2005; Chavez. A. P. A., 2017). Innovations that are constantly changing and rapid technological changes that shorten the life of products have forced firms to use technology beyond their borders. The acquisition of technology from external sources requires the establishment of an appropriate and



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integrated relationship between the firm and external sources, including the supply chain (Noori, 1990).

Fixon is one of the first researchers to seriously research the product architecture. Using 3D synchronous engineering, the product architecture is a tool for integrating the three areas of product development, process development, and supply chain, and a 3D model called the impact of product design design on product, process, and supply chain decisions. Expression (Fixon, 2005).

Competitive Advantage

The competitive advantage includes a set of factors or capabilities that always enable the company to demonstrate performance better than its competitors (Liz, 2001). In other words, competitive advantage is a factor or a combination of factors that in a competitive environment makes the organization much more successful than other organizations and competitors can not easily immitate it (Barney, 1999).

Therefore, in order to achieve a competitive advantage, an organization must also pay attention to its external situation and consider the internal capabilities (Appelbam, 2000; Brunner. J. J. & Ganga-Contreras. F., 2017).

In the path to creating a competitive advantage, two important points to consider are: First, this is the pathway of the sequence that leads to high performance and competitive ability of the organization. That is, if an organization can, by virtue of its merits, create a sustainable competitive advantage that is valued for its customers and always superior to its competitors, it actually has a decent function and brought competitiveness (Barney, 1999). Secondly, due to the increasing complexity of the environment and the intensity of competition, the competitive advantage is easily imitated by rivals or, in the eyes of customers, it soon becomes painted, and should be replaced with new advantages (Liz, 2001 and Peng et al., 2017).

Accordingly, the organization should look for its competitive advantage. Creating and sustaining competitive advantage requires competencies that rely on the organization's capabilities for value to customers.



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The company's resources include assets, capabilities, organizational processes, information, knowledge, and so on, which regulates their company to develop and implement value-added strategies. These resources can be seen in three tangible, subtle, and organizational capacities (Apelaim, 2000).

The company's capabilities are a combination of skills, knowledge and behaviors that are present all over the time and reflected in individuals, systems, processes and structures. In other words, the skills that the company uses to transform data into outputs is to integrate tangible and intangible resources into organizational goals in order to achieve the desired goals such as: customer service, the ability to develop superior products, innovate Services and goods .Competencies are the perfect combination of assets, resources, and processes that allow the company to respond to customer needs. Those competencies have a strategic value that can be valuable to customers. As stated, the main goal of the organization is to create a competitive advantage by relying on the resources and capabilities it possesses, to compete and achieve a privileged position in terms of functionality in a customer-centric market.

The key to this is to achieve competitiveness, to maintain competitive advantages based on the understanding of customer needs and customer focus, as well as on customer-facing processes. Sustained competitive advantage refers to those competitive advantages that have been valued for customers through the use of competencies of the organization, are not easily imitated and copied by competitors, and brought about decent performance and competitiveness for the organization . The concept of competitive advantage denotes the superiority stemming from certain abilities or the combination of abilities that a superior competitor has exclusively or in large proportion to competitors (Anton, 2000).

The most important features of the competitive advantage are durability, invulnerability and value. Distinction as the main source of gaining competitive advantage. The concept of differentials is fundamental to Chamberslin's exclusive competition in 1933, which determined that customers might have distinct choices in the same industries from existing products.

Later, in the 1980s, Prover used the general strategy of differentiation, when a business enterprise created a tangible or intangible thing, which at least was known as "unique" by one of the



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customers. So the customer's perception determines the range of product differentiation. In some studies, IT has also been talked about as an agent for the competitive advantage of organizations (Stormmer, 2013).

Distinction has been widely considered as a general public strategy by all industries. (Bill and Yassi Ardekani 200, Hamburg, Coroner & Worm 1999), but the consequences of this performance are still not well known. (Campbell and Hunt 2000).

On the other hand, it seems that many differentiation strategies are likely. For example, Miller discussed the two distinct strategies of differentiation in 1986: Innovation and marketing sponsored by Lee and Miller in 1999.

In the widespread classification of the Myensburg Differentiation Strategies in 1988, he proposed six types: quality, design, support, shape, price and inseparable products. Which has an experimental support provided by Kota and Vallamani in 1995.

Recently, strategy researchers have found the difference between vertical and horizontal differentials that are widely used in IO writings. (İtirir and Zoh 2008 and Makaduk 2010 and 2011).

All customers, in the case of vertical differentiation, prioritize the availability of products in a ranking, provided they have the same price. In such a case, competition among commercial firms will be in one dimension only, and the most distinctive business enterprise will provide the highest level in such a dimension.

For example, by offering the highest level of quality, a hotel will be more appealing to all customers (Mafi et al.2012). In this case, even if customers have the same rating for the quality of the products available. Products are sold at different prices because customers have different demands for paying money to improve their qualities.

Which is fundamentally related to their income. However, customers often have different preferences in desirable product and service characteristics. Therefore, a single ranking along a quality index can not be extended to existing commercial firms that all customers agree with.

This is a horizontal differentiation that, even if all products are sold at the same price, commercial firms acquire a different stock market because their products are unmatched by the characteristics



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and characteristics that are preferred by a particular group of customers. For example, brand loyalty to a business firm is more appealing to a specific group of customers with similar needs, which limits the amount of replacement among competing business entities. (Macadox 2010). It is often written about product differentiation based on the difference between vertical and horizontal distinctions. (Bess & Ketsulacs 1991). However, strategy researchers have ignored this difference to this day. (Makaduk and Rose 2009).

Makaduk and Rose in 2009 and Makaduk in 2010 and 2011 in a series of theoretical papers predicted the effect of both types of differentiation as well as the effects of their interaction. However, there are empirical sources of scarcity in the strategy about both types of differentiation. In one empirical study on Differentiation Strategies (Etiraj and Zoo 2008), competition was primarily based on horizontal differentiation in the early stages of industrial development, which makes the profit of the operators fairly sustainable. However, the evolved industries, ie new arrivals with a greater vertical distinction, have the potential to overcome the operators (Becra et al., 2012).

There are many reasons why there has been a failure to account for about 40% of new product development projects over the past years.



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Conceptual model of research:

The basic model proposed in this study is as follows.

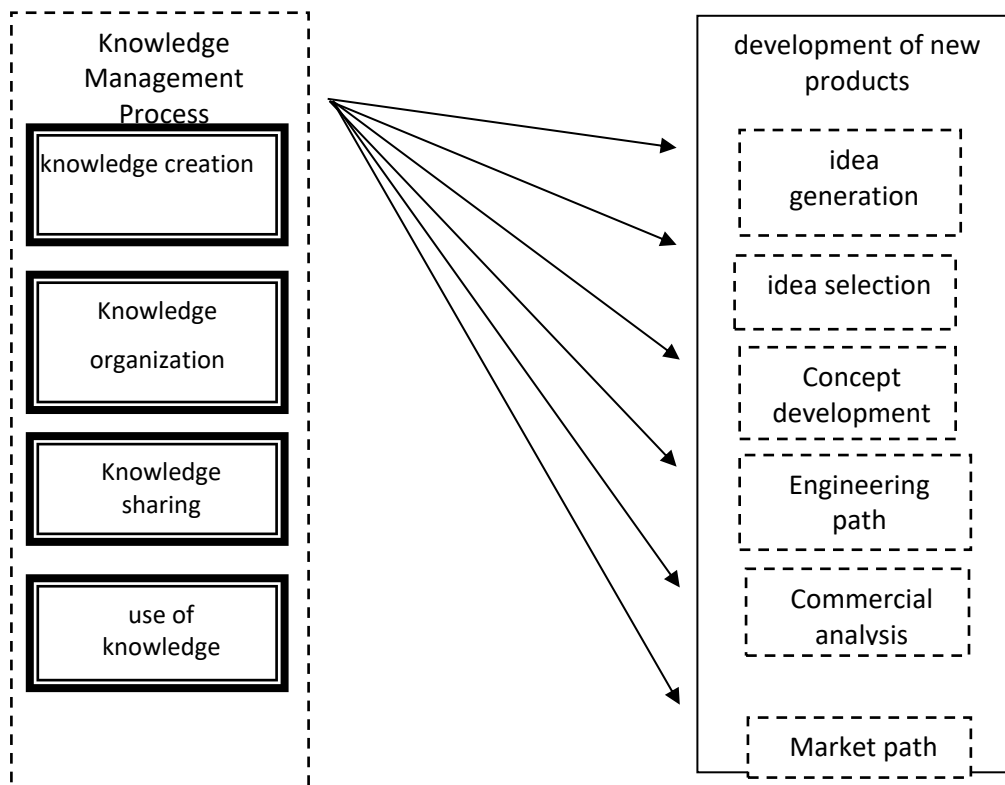


Figure 1: H1 hypothesis

Research method:

The method used in this research is descriptive-survey and a 3-part questionnaire, whose options have been designed based on Likert scale, were used to collect the required information. The questionnaires are distributed among the members of the statistical sample in the organization and, in order to resolve the questions and possible ambiguities of some questions for the respondents, when they complete the questionnaire in person, some of them are contacted and their questions are answered.

The number of people in the statistical population was 97, whose characteristics were their knowledge. Participants are vice-presidents or supervisors of organizations and other parts of the organization, including managers of human resources and active experts in the field of knowledge



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management and research and development. Data collection was done during the fall and winter of 1996. From the random distribution of 110 questionnaires, 97 items were completed and returned.

Regarding the questionnaire of knowledge management process, it should be noted that considering the fact that there was no questionnaire about this issue beforehand, using valid sources about the four dimensions of knowledge management process (Hsin, 2007) and (Moreno, 2011) A questionnaire containing 12 questions of 5 options was designed based on Likert scale. All four dimensions were evaluated by three questions.

In order to determine the validity of the questionnaire, expert opinion was used. Cronbach's alpha method was used to measure the reliability of the questionnaire and its rate was 0.86. A new standard questionnaire has been used in six dimensions for the development of new products. Its validity and reliability have been confirmed in previous studies (Riazi, 2010). As for the distribution of data, the Smirnov test was performed and the normal distribution of all aspects of the questionnaire was confirmed.

Analysis

Demographic information analysis

The table below shows the respondents' sociological status in the organization.

Table 1. Sociological status of respondents to questionnaires

situation	Index	Rows
men and (45%) women (%55)	gender	1
under 30 years old (47%) between 30-35 years old (13%) between 35-40 (%28) years old - (12) over 40 years	Age	2
(graduate (53%), senior (40%) and PhD (7% (%0)	education	3
expert, (20%) supervisor, (13%) deputy and (7%) director (%60)	Job Type	4
under 5 years (45%) 5 to 10 years, (26%) 10 to 15 years and (9%) more (%20) than 15 years	Service history	5



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Investigating the Relationship Between the Components Affecting New Product Development and the Dimensions of Knowledge Management Process:

First hypothesis: Six effective dimensions affect the development of a new product with the production of knowledge.

Second hypothesis: Six effective dimensions affect the development of a new product with the organization of knowledge.

Hypothesis 3: Six effective dimensions affect the development of new products by sharing communication.

Fourth hypothesis: Six effective dimensions affect the development of a new product by utilizing knowledge.

According to the literature review, knowledge management has a significant impact on activities related to the development of new products.

Therefore, in this section, with the help of test-benchmarking, we tried to find out what the results of the correlation test were. It showed that the ideational dimension, ideation and development of the concept with all four dimensions of the process of knowledge management (knowledge production and acquisition, storage and organization Knowledge, knowledge sharing and dissemination, and the use of knowledge), this claim can be verified according to the level of significance achieved.

In other words, the four dimensions of knowledge management among the employees of the organization are higher, then the ideas, ideas and development of the concept are in a better position.

Then, the engineering route also has a positive and meaningful relationship with the application of knowledge. There is no significant relationship between the dimension of business analysis and market path with the four dimensions of knowledge management.

Table 2: Correlation test between new product development dimensions and knowledge management process



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		idea generation	idea selection	Concept developme nt	Engineeri ng path	Commerc ial analysis	Market path
knowledge creation	Pearson	.505**	.411**	.208**	.235	.117	.421
	Correlation						
	Sig. (2-tailed)	.000	.000	.009	.029	.023	.011
	N	97	97	97	97	97	97
Knowledge organization	Pearson	.448**	.508**	.266**	.218	.266	.745
	Correlation						
	Sig. (2-tailed)	.000	.000	.000	.010	.014	.020
	N	97	97	97	97	97	97
Knowledge sharing	Pearson	.323**	.311**	.609**	.391	-.021	.193
	Correlation						
	Sig. (2-tailed)	.001	.001	.000	.031	.858	.104
	N	97	97	97	97	97	97
use of knowledge	Pearson	.497**	.232**	.406**	.262*	.239	.282
	Correlation						
	Sig. (2-tailed)	.000	.000	.000	.000	.053	.086
	N	97	97	97	97	97	97

In the following, multivariate regression analysis has been used to examine the effect of KM process dimensions on the development of new products. Using a multivariate regression analysis, a model has been derived:

$Y = 0.623x_1 + 0.519x_2 + 0.199x_3 + 0.06x_4 + \varepsilon$ in which x_1 represents knowledge generation, x_2 represents the organization of knowledge, x_3 represents knowledge sharing and x_4 represents the use of knowledge.



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Which according to the results of all four factors show their positive effect. Of course, this effect is more in the production of knowledge.

Table 3: Multivariate regression test

Model	Unstandardized Coefficients		Standardized Coefficients	t
	B	Std. Error	Beta	
(Constant)	-.555	.466		-1.599
knowledge creation	.623	.189	.366	3.356
Knowledge organization	.519	.134	.308	4.167
Knowledge sharing	.199	.078	.268	2.601
use of knowledge	.060	.111	.049	.401

Test the mean of knowledge management process

Hypothesis: The average dimension of knowledge management process is three

H_0 : The average post-process knowledge management process is equal to 3

H_1 : The average post-process knowledge management process is equal to 3

With regard to the significance level and the obtained coefficient T, we conclude that the assumption is zero and the average knowledge management process is not equal to 3.

Since the upper limit in the negative number and the lower limit is also a negative number, we conclude that the mean value of the knowledge management process is less than the test value, that is, the number three.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
KM process	97	2.3996	.70159	.08910



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One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
KM process	-7.566	96	.001	-.68762	-.8987	-.5451

Test the average dimensions of new product development

Hypothesis: The average development dimension of a new product is three times.

H_0 : The average of the next product development is 3

H_1 : The average of the next product development is not 3

Based on the significance level and the obtained coefficient T, we conclude that the assumption of zero is accepted and the mean of the new product development dimension does not differ significantly with the test value (3).

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
new product	97	3.0011	.70118	.08243

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
new product	-.111	96	.933	-.00845	-.1723	.1558



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Conclusion:

The business success of an organization in today's changing and turbulent world is similar to that of a car race. The business success of most business enterprises depends on their ability to identify customer needs and the rapid creation of products to meet those needs at the lowest cost. Product development is the general name of all activities aimed at improving or innovating existing products or new products

The basis for survival and success in all companies and the key source of innovation in the industry. Product architecture as one of the components of product strategy plays a decisive role in formulating and integrating product strategy strategies, operations as well as supply chain of a firm while developing a new product.

In this research, the attitude of the staff of the leading oil companies on the relationship and impact of the four dimensions of knowledge management with six factors (ideation, ideas, engineering path, concept development, market pathway and business analysis) has been attempted to influence the development of new products.

The results of the data analysis showed that there were four significant dimensions of knowledge management (knowledge generation, knowledge organization, knowledge sharing and knowledge use) with three dimensions of ideas, ideation and development of the concept of positive and significant relationship.

The two dimensions of market pathway and business analysis with four dimensions of communication management management process were not confirmed. The next link to engineering was confirmed only by the application of knowledge. The results of the mean test showed that both product development and knowledge management are not in a good position.

Also, the results of regression test showed that all four aspects of knowledge management process have a positive and significant effect on new product development.

Providing short-term and strategic solutions to address current problems and issues of product development in the oil industry, reviewing innovative approaches in developing new products, studying the role of organizational culture, organizational structure, social and intellectual capital and information technology in order to achieve the highest effectiveness of new product



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development It is suggested by researchers with different methods of modeling and fuzzy methods as future research topics.

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