



The Effect of Customer Involvement on Product Innovation Performance, with the Mediating Role of Customer Online Knowledge Contribution and the Moderating Role of Customer Online Community Affiliation  
(Case Study: Zarin Iran Porcelain Industries)

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**Abstract**

The purpose of this study is to evaluating the effect of customer involvement on product innovation performance, with the mediating role of customer online knowledge contribution and the moderating role of customer online community affiliation. The research method is applied in terms of purpose and in terms of collecting data, descriptive survey. The population of this study is the zarin iran porcelain industries customers. For this purpose, with using Cochran formula, 420 questionnaires were distributed between the statistical sample and 391 questionnaires was gathered. The data collection tool was a questionnaire whose reliability was calculated as 0.83 using Cronbach's alpha coefficient. The validity of the research instrument was confirmed by confirmatory factor analysis technique. Structural equation modeling method was also used for data analysis. The results of the research showed that customer involvement have the effect on product innovation performance, with the mediating role of customer online knowledge contribution and the moderating role of customer online community affiliation.

**Keywords:** *Customer Involvement; Product Innovation Performance; Customer Online Knowledge Contribution; Customer Online Community Affiliation*

**Introduction**

Every day, companies generate and market ideas by reviewing fundamental ways (Chesbrough, 2003). Since the internal research and development of companies is not a very accurate and low-cost process for a long time and continuously, customer involvement in management themes as a tool to strengthen the loop between consumption and production cycles is widely known. It has been noticed and praised (Tomaki and Von Hippel, 2002; Gales and Mansoor Cole, 1995). Today, every company needs to involve its customers calculatedly in different sectors such as: development of products and services,

innovation, marketing, etc. Because the basis of many managerial perspectives in this field is that customers are valuable sources of information and knowledge (Norman and Ramirez, 1994). According to previous studies (for example: Shi et al., 2023) that have stated that customer involvement is a double-edged sword, with a non-linear effect on product innovation performance, this research tries to investigate the effect of customer involvement on product innovation performance and Taking into consideration the mediating role of customer online knowledge contribution and the moderating role of customer online community affiliation in the Zarin Iran Porcelain Industries.

### ***Problem Statement***

Today, in the business world, cooperation between companies and customers has increased in the fields of product development and innovation. Product innovation can increase competitive advantage either directly or by improving the company's image (Vijaya and Rahayu, 2021). On the other hand, digital technologies have created a new paradigm shift in every aspect of our society (Bram et al., 2022). Recent studies show that after the Covid-19 pandemic, consumers conduct most of their business activities using online media (Shankar et al., 2022). In this field, consumers involve themselves in actions initiated by the company and provide information to producers that is very important for the company (Chang and Taylor, 2016). The needs, expectations, feedback, efforts and knowledge of customers are vital information that help companies to adapt themselves to market demands and various aspects of technology and develop innovative processes of their products (Mangok et al., 2014).

In the field of e-commerce, customer engagement (CI) can be considered as a company's ability to create an environment where consumers and producers can interact directly in the product production process (Anning-Dorson, 2018). Today, engaging customers through online channels has become very common. These channels are divided into open platforms (for example, social media and business platforms) and company-hosted platforms (for example, online company forums). Companies use online communities to attract customers, collect data related to customers' needs and knowledge, and prevent them from churning (Liu et al., 2020). In this way, companies actively approach their target customers and invite them to participate in the innovation process of their products (Roberts et al., 2016).

Considering that many customers are involved in the product innovation process of companies through online communities, the relationship between customer involvement and product innovation performance is likely to be influenced by customers' feelings towards these communities and their perceived value (Liu and Guo, 2015). In the online platform, customer involvement can create a common identity among a large number of customers and provide an active and useful knowledge sharing environment. This increase in online partnerships affects the company's product innovation performance (Marzouki and Belkahla, 2020). As a result, based on the knowledge-based perspective (KBV), customer knowledge is a strategic resource that can be used for innovation (Julanski et al., 2016).

By reviewing the literature, it is concluded that there are different views on the effects of customer involvement on product innovation performance. Most of these views say that the relationship between customer involvement and product innovation performance is direct and linear (for example, the views of Nohotlo et al., 2022; Thakur, 2018; Carlson et al., 2018; Kang, 2017). But there is also research in this field that places customer involvement in a more negative spectrum in terms of product innovation by highlighting different types of risk. Excessive dependence on customers and high monetary and time costs are among the risks that weaken the positive effects of customer involvement on product innovation performance; Because it expresses an unknown and misunderstood relationship between these two variables (Shi et al., 2023). Finally, it is unclear how customer engagement through online communities contributes to a firm's product innovation performance. Although previous researchers have shown the mediating role from the perspective of marketing (e.g. legitimacy pressure, market ambiguity, etc.) or firm capabilities (e.g. marketing capabilities, technological capabilities, etc.) (e.g. Zhang et al., 2015;

Chen et al. et al., 2021), but they have not investigated what internal mechanisms may be involved in this relationship, from the perspective of KBV. An online community determines whether a company is able to gather sufficient and valuable customer knowledge. Therefore, for product innovation, the mediating role of "customer online knowledge sharing" is critical from a theoretical and empirical point of view.

The basic question of this research is as follows:

What is the effect of customer involvement on product innovation performance, with the mediating role of customer online knowledge contribution and the moderating role of customer online community affiliation in zarin iran porcelain industries?

### ***The Necessity and Importance of Research***

Today, the business environment is constantly evolving and manufacturing companies must adapt and coordinate with these changes. Since the competition between companies has increased, every product manufacturing company has to produce innovative products to survive in this hot environment. In open innovation contexts, companies may decide to collaborate with their customers for the purpose of product development (Hormlina- Laukanen et al., 2021). Compared to companies' research and development employees, customers have a special advantage in terms of presenting attractive business ideas and solving product-related problems in order to meet their needs (Liu et al., 2020). RDT is a suitable theoretical framework for this study; Because it states that the behavior of a company depends on multidimensional and external sources (Jaja et al., 2017). Customer involvement is a unique external resource that can contribute to the success of a company's product development (Morgan et al., 2018). Therefore, RDT is a viable perspective to understand the impact of customer involvement on product innovation performance through online communities of companies (Gruner and Hamburg, 2000). By using customer engagement, the company can hear the voice of the consumers of its products (Grimp and Kaiser, 2010), receive timely feedback (Mangok et al., 2014; Morgan et al., 2018), the risks of non-adoption and low return on investment. reduce investment and ultimately improve the innovation performance of your product (Shen et al., 2018). In general, customer involvement has three levels: low, medium and high (Bitner et al., 1997). Now there are studies that state that uncertainty in product innovation and uncertainty in its management are seen in high levels of customer involvement (Enkel et al., 2005; Chan et al., 2010; Song et al., 2013) because with increasing The level of participation, customers may have unrealistic expectations and this prevents the correct definition of the product (Bohlman et al., 2013; Saldanha et al., 2017). In addition, the impossibility of responding to the demands of every customer and creating job stress for internal research and development employees to choose the right and useful ideas about the product are among the negative effects of a high level of customer involvement (Chan et al., 2010; Hsieh and Yen, 2005; Cornish and Ulrich, 2014) .

Since customers interact with each other through online communities, they often experience strong dependency in their online communication (Shen et al., 2018). Previous research has shown that in these communities, the level of communication with the customer and the flow of knowledge is related to the customer online community affiliation (Kasalo et al., 2007; Maishak et al., 2013). Through this affiliation, companies can enjoy several benefits such as a positive community atmosphere, easy access to valuable resources, and consumer experiences (Francis et al., 2012). Therefore, customer online community affiliation can influence the inverted U-shaped relationship between customer involvement and product innovation performance. Thus, for low or medium levels, high dependence of the online community can strengthen the positive effect of customer involvement on product innovation performance. Customers who have high attachment to the online community, are responsible and trustworthy, and are generally loyal to a particular company, thereby providing more feedback and support, which can help reduce innovation risk (Xuemei Xie et al., 2023). Based on the commitment-trust

theory, the interaction between customers (with high dependence) and R&D employees of companies is usually more efficient and reduces the job stress of these employees.

This research can create a spark in the minds of decision-making and decision-making managers in Iran's zarin porcelain Company, so that based on it, they have a better understanding of the innovation and improvement of the quality of their products and can attract maximum customers for their company and their satisfaction with the products to bring.

## ***Research Objectives***

### **The Main Research Objectives**

1. investigating the effect of Customer involvement on product innovation performance, with the mediating role of customer online knowledge contribution in Iran's Zarin porcelain industries.
2. investigating the effect of Customer involvement on the product innovation performance, with the moderating role of customer online community affiliation in Iran's Zarin porcelain industries.

### **Minor Research Objectives:**

1. investigating the effect of Customer involvement on product innovation performance in Iran's Zarin porcelain industries.
2. investigating the effect of Customer involvement on the customer's online knowledge contribution in Iran's Zarin porcelain industries.
3. investigating the effect of Customer's online knowledge contribution on product innovation performance in Iran's Zarin porcelain industries.

## ***Hypotheses***

### **The Main Research Hypotheses**

1. Customer involvement has a significant effect on product innovation performance, with the mediating role of customer online knowledge contribution in Iran's Zarin porcelain industries.
2. Customer involvement has a significant effect on the product innovation performance, with the moderating role of customer online community affiliation in Iran's Zarin porcelain industries.

### **The Minor Research Hypotheses**

1. Customer involvement has a significant effect on product innovation performance in Iran's Zarin porcelain industries.
2. Customer involvement has a significant effect on the customer's online knowledge contribution in Iran's Zarin porcelain industries.
3. Customer's online knowledge contribution has a significant effect on product innovation performance in Iran's Zarin porcelain industries.

## **Research Conceptual Model**

The theoretical research model used in this research is derived from the studies of Xuemei Xie , Lijun Wang , Tao Zhang (2023).

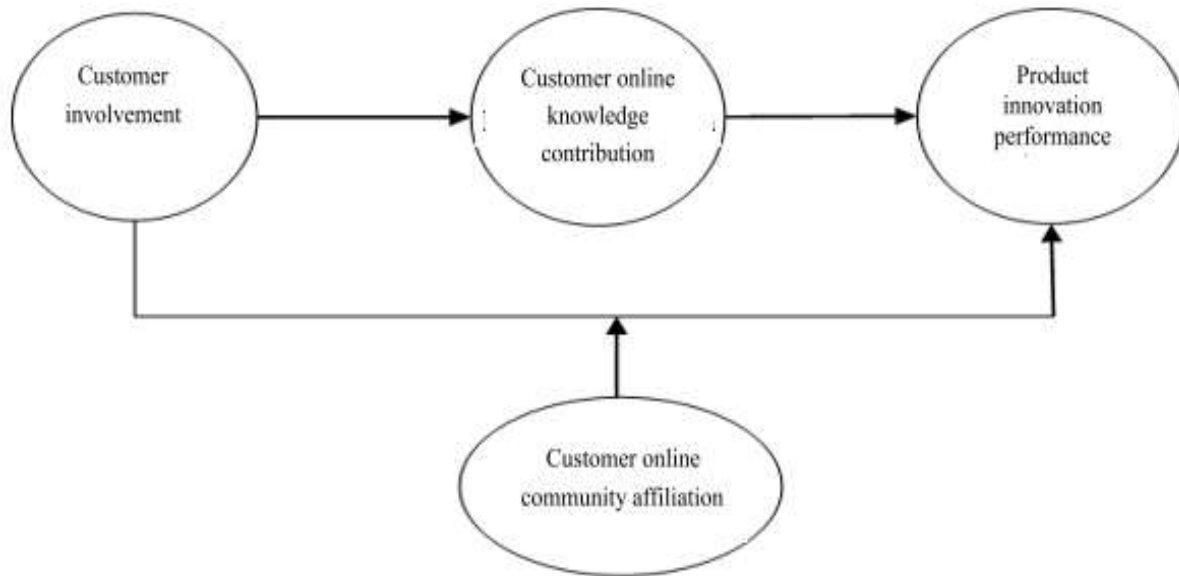


Figure 1. Research conceptual model taken from Xuemei Xie , Lijun Wang , Tao Zhang (2023).

### **Research Background**

In an article, Najafi Towani et al. (2022) investigated the relationship between "customer involvement and product innovation performance" with regard to the moderating role of "relationship management theory and role ambiguity perspective". The purpose of this research is to determine the levels of relationship quality and role ambiguity that can make customer engagement ineffective. With the questionnaire tool, a survey has been conducted among 273 Iranian manufacturing companies, the results of which show that there is an inverted U-shaped relationship between customer involvement and product innovation performance, as well as the interaction of relationship quality and role ambiguity significantly in this relationship.

Adjusts According to the research background, Etebari et al. (2023) considered the effectiveness of customer involvement in the new product development process as a necessity and considered the moderating effect of "temporal style congruence" in the relationship between "customer involvement and the time of turning an idea into a product". have analyzed Its statistical population was new product development projects in various industries, and its sampling was by judgmental method and the volume of 200 projects. The data was analyzed by the method of structural equations and the results show that the participation of customers with the manufacturer in the process of new product development in industrial marketing, along with the consistency of the time style and through the same understanding and perception of it, can shorten the time. Turn the idea into a product.

Ahmadizad, Arman et al. (2022) in an article titled "Consequences of customer involvement for the purpose of creating new products in the tourism industry" stated that the method of this study was survey-correlation and single-section and among the customers of the service agency A non-random sampling was carried out in Kurdistan Province. The data were collected using the questionnaire tool and analyzed and analyzed using the structural equation modeling method. The findings of this research have determined the effect of customer involvement on customer satisfaction, loyalty and cost, as well as the speed of innovation. The results show that the participation of customers in inventing new products of this agency, among the four dependent variables mentioned, has the most positive effect on customer satisfaction with the company (with a path coefficient of 0.609) and the least effect on the speed of product innovation. company (with a path coefficient of 0.390).

Xuemei Xie , Lijun Wang , Tao Zhang (2023) compiled research entitled online community customer involvement in product innovation: the effect of a double-edged sword. In the field of customer involvement and product innovation of companies, some researchers based on their own findings have provided a positive evaluation of the usefulness of customers in product innovation, while others have presented an insignificant or even negative evaluation of the usefulness of customers in this field. Have. This paper reconciles these different views by showing that there is a non-linear relationship between customer involvement and firms' product innovation performance. To reach this conclusion, researchers have used survey data from Chinese manufacturing companies and their online community customers, as well as objective data from the Chinese technology company Xiaomi, to empirically test their hypothesized nonlinear relationship theory. The results of the analysis of two data sets show that there is an inverted U-shaped relationship between online customer engagement and the product innovation performance of companies. Additionally, researchers have found that customer online community affiliation moderates this relationship. Specifically, for low or moderate levels of customer involvement, online customer community affiliation strengthens the positive online customer involvement-product innovation performance relationship, while for high levels of customer involvement, such affiliation moderates the positive effect of online customer involvement on performance. Product innovation undermines companies. In addition, the researchers in this paper have shown that the factor "customer online knowledge contribution" mediates the relationship between customer involvement and product innovation performance. This study has provided new empirical insights into the effects of customer involvement and customer knowledge contribution through online communities on product innovation performance so that companies can use these findings to best engage online customers in product innovation to achieve Contribute the most effective performance.

Zhang et al. (2023) conducted research on increasing the innovation capability of subsidiary companies through customer involvement in new product development. This research has focused on two types of participation, i.e. "Using customers' participation as a source of information (CIS) and using customers' participation as a joint developer (CIC)" that these two roles, and their contribution to the innovation capability of the subsidiary company. They depend on the derivation of technological know-how from the headquarters or its local partners. The data collection tool was a questionnaire and the final sample size was 230 companies. The findings of this research show; Technological knowledge transfer from headquarters increases the effect of CIS on innovation capability, but decreases the effect of CIC.

In a research, Kumar et al. (2022) investigated "the dark side of online communities, especially the barriers to customer interaction in these communities". This research has also investigated the mediating effect of "anticipated negative emotions" and the moderating effect of "association occupation and previous customer attitude". A total of 301 responses have been collected from members of online communities to examine the proposed hypotheses of this research based on the Innovation Resistance Theory (IRT). The findings show that performance, information load and identification barriers have a positive effect on users' non-participation intention towards the online community. Anticipated negative emotions mediate the relationship between barriers and customer non-participation, and the role of community tenure is considered a critical moderator. This research suggests to marketers how they can reduce customer disengagement in online communities.

Sui and Wu (2021) compiled research titled using customer knowledge in innovation: antecedents and the effect of customer involvement on new product performance. This study examines the antecedents and impact of three forms of customer involvement in innovation: customer involvement as information sources (CIS), customer involvement as co-developers (CIC), and customer involvement as innovators (CIN). They stated that the three forms of customer involvement have used different ways to use customer knowledge, which are differently affected by the nature of customer knowledge, the company's knowledge management strategy, and organizational support for the implementation of knowledge management. Using primary data from several industries, they test a set of drivers along these three dimensions and find that the three forms of customer engagement are driven by different factors.

Moreover, the effect of customer involvement on new product performance is conditional on the firm's technological capability, and the conditional effect is also different across different forms of customer involvement. These findings provide important theoretical implications as well as practical guidance for adopting and managing customer involvement in innovation.

Cheng et al. (2020) compiled research titled how to increase the participation of small and medium company customers using social media, considering the role of social customer relationship management. Despite increasing attention to the impact of customer engagement and social media on innovation development in SMEs, few studies have investigated how to improve the effectiveness of customer engagement based on social media. Relying on the knowledge-based perspective, social networks, and capability theories, researchers address the question of how social customer relationship management increases the impact of social media-based customer engagement on innovation. They have stated that two key capabilities increase the moderating effect of social customer relationship management: (1) social media network (2) customer information processing capabilities. Results from a longitudinal dataset of 317 SMEs show that SME customer engagement, enabled by social customer relationship management, social media network and customer information processing capabilities, enhances innovation. These findings have important implications for researchers and managers interested in increasing the efficiency of SME customer engagement using social media.

### ***Research Methodology***

The current research is "applied" in terms of purpose, and "descriptive-survey and field" in terms of method.

### **Research statistical Population and Sample Size**

The statistical population considered in this research is customers of zarin iran porcelain, who participated in the online community with the aim of improving the innovative performance of this company's products .

Considering the limitedness of the community (760 thousand supporters on the official zarin iran porcelain page on Instagram), the sample size was determined by using Cochran's formula, 384 people and by simple random sampling method .

### **Structural Equation Modeling (SEM Model)**

In this research, due to the non-normality of the research variables, in order to test the hypotheses, structural equation modeling was used using the partial least squares method using Smart PLS software.

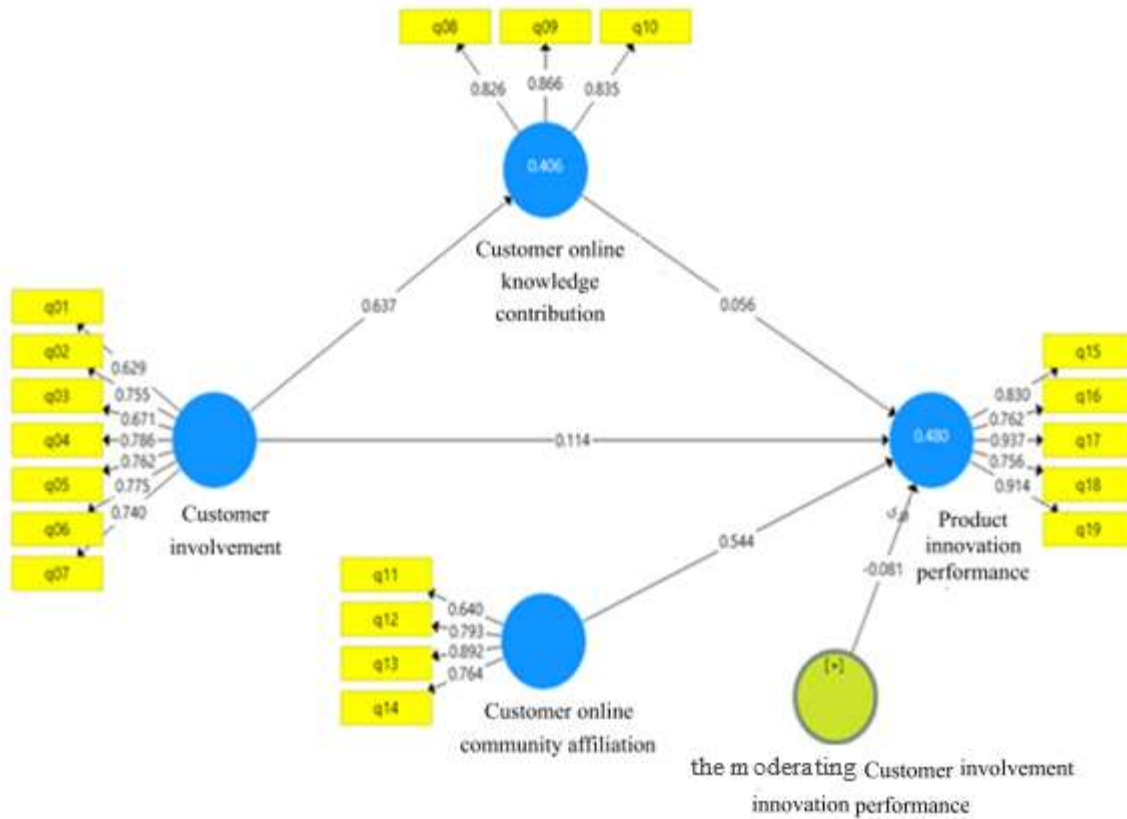


Figure 2 shows the significance of the path coefficients of the research model

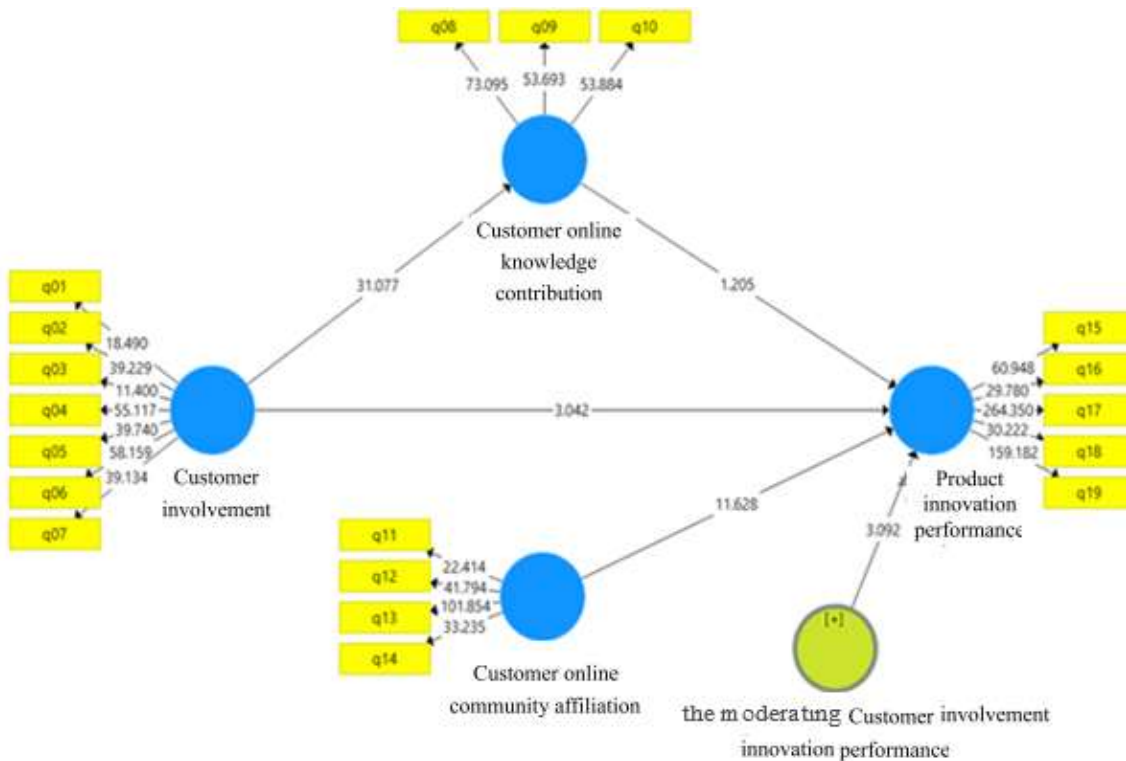


Figure 2. Significant coefficients



## Analysis of Hypotheses

### The First Main Hypothesis

The result of the investigation of the first main hypothesis of the research is shown in the table below .

Table 1. Examination of the first main hypothesis

The coefficient of F	Sobel statistic	result
0.238	5.118	confirmation

As the above table shows, the reported Sobel index is equal to 5.118. Considering that this Sobel statistic is higher than 1.96, we conclude that the first main hypothesis of the research is confirmed at the confidence level of 95%. This means that the online customer knowledge contribution in Iran's Zarin porcelain industries has been able to play a mediating role between customer involvement and product innovation performance. Due to the fact that the amount of Ff statistic is equal to 0.238, therefore, the mediation rate of the variable of customer online knowledge contribution is equal to 0.238 units .

### The Second Main Hypothesis

Customer involvement has a significant effect on the product innovation performance, with the moderating role of customer online community affiliation in Iran's Zarin porcelain industries.

The result of the investigation of the second main hypothesis of the research is shown in the table below .

Table 2. Examination of the second main hypothesis

Significant coefficient	Path coefficient	Result
3.092	-0.081	Confirmation

As the above table shows, the reported Significant coefficient is equal to 3.092. according to the Significant coefficient is higher than 1.96, we conclude that the second main hypothesis of the research is confirmed at the confidence level of 95%. This means that customer online community affiliation in Iran's Zarin porcelain industries has been able to play a moderating role between customer online community affiliation and product innovation performance. Due to the fact that the amount of path coefficient is equal to -0.081, This means that the customer online community affiliation in Iran's Zarin porcelain Industries has been able to moderate the effect of customer involvement on product innovation performance by 0.081 units.

### The First Minor Hypothesis

Customer involvement has a significant effect on product innovation performance in Iran's Zarin porcelain industries.

The result of the investigation of the first minor hypothesis of the research is shown in the table below .

Table 3. Examination of the first minor hypothesis

Significant coefficient	Path coefficient	Result
3.042	0.114	Confirmation

As the above table shows, the reported Significant coefficient is equal to 3.042. According to the Significant coefficient is higher than 1.96, we conclude that the first minor hypothesis of the research is confirmed at the confidence level of 95%. Due to the fact that the amount of path coefficient is equal to 0.114, therefore, whenever one unit is added to the customer involvement score, the product innovation performance in Iran's Zarin porcelain industries increases by 0.114 units.

### **The Second Minor Hypothesis**

Customer involvement has a significant effect on the customer's online knowledge contribution in Iran's Zarin porcelain industries

The result of the investigation of the second minor hypothesis of the research is shown in the table below .

Table 4. Examination of the second minor hypothesis

<b>Significant coefficient</b>	<b>Path coefficient</b>	<b>Result</b>
31.077	0.637	Confirmation

As the above table shows, the reported Significant coefficient is equal to 31.077. According to the Significant coefficient is higher than 1.96, we conclude that the second minor hypothesis of the research is confirmed at the confidence level of 95%. Due to the fact that the amount of path coefficient is equal to 0.637, it means that, whenever one unit is added to the customer involvement score, the participation of customer's online knowledge in Iran's Zarin porcelain industries increases by 0.637 units.

### **The Third Minor Hypothesis**

Customer's online knowledge contribution has a significant effect on product innovation performance in Iran's Zarin porcelain industries.

The result of the investigation of the first minor hypothesis of the research is shown in the table below .

Table 5. Examination of the third minor hypothesis

<b>Significant coefficient</b>	<b>Path coefficient</b>	<b>Result</b>
1.205	0.056	Rejection

As the above table shows, the reported Significant coefficient is equal to 1.205. According to the Significant coefficient is less than 1.96, we conclude that the third minor hypothesis of the research is rejected at the confidence level of 95%. In other words, participation of customer's online knowledge has not affected on the product innovation performance in Iran's Zarin porcelain industries increases

## ***Discussion and Review***

### **The First Main Hypothesis**

Customer involvement has a significant effect on product innovation performance in Iran's Zarin porcelain industries.

As the research findings showed, the reported Significant coefficient is equal to 3.042. According to the Significant coefficient is higher than 1.96, we conclude that the first minor hypothesis of the research is confirmed at the confidence level of 95%. Due to the fact that the amount of path coefficient is

equal to 0.114, therefore, whenever one unit is added to the customer involvement score, the product innovation performance in Iran's Zarin porcelain industries increases by 0.114 units. Based on this, it can be stated that in order to increase the effectiveness of customer involvement on product innovation performance, Zarin Porcelain Industries of Iran needs to pay attention to the variable of customer online knowledge participation. The result of the analysis of this hypothesis is agreed with the results of Xuemei Xie, et al. research (2023).

### **The Second Main Hypothesis**

Customer involvement has a significant effect on the product innovation performance, with the moderating role of customer online community affiliation in Iran's Zarin porcelain industries.

As the research findings showed, the reported Significant coefficient is equal to 3.092. according to the Significant coefficient is higher than 1.96, we conclude that the second main hypothesis of the research is confirmed at the confidence level of 95%. This means that the customer online community affiliation in zarin iran porcelain Industries has been able to moderate the effect of customer involvement on product innovation performance by 0.081 units. This result shows that the higher the level of customer online community affiliation in Iran's Zarin porcelain industries, the lower the level of influence of customer involvement on product innovation performance .The result of the analysis of this hypothesis is agreed with the results of Xuemei Xie , et al.'s research (2023).

### **The First Minor Hypothesis**

Customer involvement has a significant effect on product innovation performance in Iran's Zarin porcelain industries.

As the research findings showed, the reported Significant coefficient is equal to 3.042. According to the Significant coefficient is higher than 1.96, we conclude that the first minor hypothesis of the research is confirmed at the confidence level of 95%. Due to the fact that the amount of path coefficient is equal to 0.114, therefore, whenever one unit is added to the customer involvement score, the product innovation performance in Iran's Zarin porcelain industries increases by 0.114 units. The product innovation performance in Iran's Zarin porcelain industries increases by 0.114 units. In fact, if Iran's Zarin Porcelain Industries seeks to increase and improve its innovative performance in product production, it must increase the level of customer participation. The result of the analysis of this hypothesis is agreed with the results of Xuemei Xie et al.'s research (2023), Sui and Wu (2021), Najafi Towani et al. (2022)

### **The Second Minor Hypothesis**

Customer involvement has a significant effect on the customer's online knowledge contribution in Iran's Zarin porcelain industries.

As the research findings showed, the reported Significant coefficient is equal to 31.077. According to the Significant coefficient is higher than 1.96, we conclude that the second minor hypothesis of the research is confirmed at the confidence level of 95%. Due to the fact that the amount of path coefficient is equal to 0.637, it means that, whenever one unit is added to the customer involvement score, the participation of customer's online knowledge in Iran's Zarin porcelain industries increases by 0.637 units. Therefore, in order to improve the level of online customer knowledge contribution in Iran's Zarin porcelain industry, the level of customer involvement should be improved. The result of the analysis of this hypothesis is agreed with the results of Xuemei Xie et al.'s research (2023).

### The Third Minor Hypothesis

Customer's online knowledge contribution has a significant effect on product innovation performance in Iran's Zarin porcelain industries.

As the research findings showed, the reported Significant coefficient is equal to 1.205. According to the Significant coefficient is less than 1.96, we conclude that the third minor hypothesis of the research is rejected at the confidence level of 95%. In other words, participation of customer's online knowledge has not affected on the product innovation performance in Iran's Zarin porcelain industries increases. In other words, customer's online knowledge contribution has not affected the product innovation performance in Iran's Zarin porcelain industries. This shows that active managers in Iran's Zarin porcelain industries should not look at increasing the level of customer online knowledge contribution as a way to improve product innovation performance. In fact, it is necessary to increase the innovative performance of the product through other variables. The result of the analysis of this hypothesis is agreed with the results of Xuemei Xie et al.'s research (2023).

### Conclusion

The results of the research showed that customer involvement have the effect on product innovation performance, with the mediating role of customer online knowledge contribution and the moderating role of customer online community affiliation.

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