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IMPACT OF CO-CREATION ON INNOVATION CAPABILITY AND FIRM PERFORMANCE: A STRUCTURAL EQUATION MODELING

EL IMPACTO DE LA CO-CREACIÓN EN LA CAPACIDAD DE INNOVACIÓN Y EL DESEMPEÑO DE LAS EMPRESAS: UN MODELADO DE ECUACIONES ESTRUCTURALES

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ABSTRACT

Traditional firms used to design products, evaluate marketing messages and control product distribution channels with no customer interface. With the advancements in interaction technologies, however, users can easily make impacts on firms; the interaction between customers and firms is now in peak condition in comparison to the past and is no longer controlled by firms. Customers are playing two roles of value creators and consumers simultaneously. We examine the role of co-creation on the influences of innovation capability and firm performance. We develop hypotheses and test them using researcher survey data. The results suggest that the implementation of co-creation partially mediates the effect of process innovation capability. We discuss the implications of these findings for research and practice on the depict and implement of unique value co-creation model.

KEYWORDS

Co-creation; Innovation Capability; Firm Performance; SEM.

RESUMEN

Las empresas tradicionales solían diseñar productos, evaluar mensajes de mercadeo y controlar los canales de distribución de producto sin una interfaz del cliente. Con los avances en las tecnologías de la interacción, sin embargo, los usuarios pueden fácilmente tener un impacto sobre las empresas: la interacción entre los clientes y las empresas se encuentra en este momento en su punto máximo en comparación con el pasado y ya no es controlada por las empresas. Los clientes están desempeñando dos roles actualmente: creadores de valor y clientes, al mismo tiempo. A diferencia de los clientes tradicionales, que no tienen ningún rol en la innovación de los productos o los servicios, los clientes de hoy han alcanzado una posición de influencia que les permite ser innovadores y co-creadores. En otras palabras, ya no son solamente compradores, usuarios o defensores leales de un producto. Examinamos el rol de la co-creación sobre las influencias de la capacidad de innovación y desempeño de la empresa. Desarrollamos hipótesis para evaluarlas utilizando datos de la encuesta de los investigadores. Los

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resultados sugieren que implementar la co-creación logra mediar parcialmente el efecto de la capacidad de innovación. Discutimos las implicaciones de estos hallazgos para la investigación y la práctica e implementamos un modelo de co-creación de valor único.

PALABRAS CLAVE

Co-creación; capacidad de innovación; desempeño de las empresas; SEM.

INTRODUCTION

The organization of the twenty first century industries is changing from firm level into customer level (Kumar and Petersen, 2013). Going into competition with traditional methods has become increasingly challenging and firms need to adjust their marketing strategies to customer-level organizations to win competitions (Lamberti and Noci, 2009). With this evolution, companies have to reconsider their marketing strategies to succeed in the competitive environment and to maximize their profitability (Hoyer et al. 2010). With the emergence of customer level marketing, the traditional lines between marketing and finance have vanished (Johnson et al., 2000; Joshi and Sharma, 2004; Lin and Huang, 2013). Therefore, an important change that most firms have gone through is to build an interface between their marketing and finance departments (Lusch and Webster, 2011). Customers are now demanding customized and personalized products and services to feel unique and stand out from crowd, so marketing has changed its focus from the features of products to customer benefits. (Joshi and Sharma, 2004). Despite the vast and rapid change in the market, most firms still depend on firm-level organizations for designing their marketing strategies (Lundkvist and Yakhlef, 2004). Firms that create new products and customize current products are doomed to failure if they do not take into the account the cost implications of marketing and the price change of their products and services (Lusch and Webster, 2011; Lundkvist and Yakhlef, 2004; Lusch, Vargo and O'Brien, 2007; Tanha et al., 2011).

This paper aims to address the abovementioned issues by examining the impact of co-creation and innovation capability on firm performance. Co-creation refers to the practices a company uses to collaborate with its stakeholders during the design, development and deployment of its products and services (Kirah, 2009). We extend and expand the existing research by proposing a subtler model on the effects of co-creation and innovation capability on firm performance for making two important contributions: (1) to compound to the rare empirical research on performance implications of the co-creation and innovation; and (2) to develop a conceptual model that better highlights the interplay between co-creation and innovation on influencing performance. In particular, we address three research questions: (1) does the co-creation affect firm performance; (2) does the innovation capability mediate the relationship co-creation and firm performance; and (3) does innovation capability affect firm performance?

LITERATURE REVIEW

Co-creation

In marketing study, shared creation of value by the customer and the supplier which necessitates the combined effort of the partners for developing a new offer means co-creation (Silva, Camacho and Vázquez, 2013). According to this conception, the main business is in the interaction point of the customer and the company rather than the value chain (Sjodin and Kristensson, 2012; Vargo and Lusch, 2008; Witell et al., 2011) and all the contributors in the co-creation process function as value co-creators which achieve new offers through the integration of resources (Woodruff and Flint, 2006). Therefore, co-creation is assumed as an approach to increase value for customers and firms (Vargo and Lusch, 2008; Witell et al., 2011). The “co-” in Co-creation refers to the actors who participate in the process of creating value and includes customers, firms, brand communities and other actors (Saarijarvi and Kannan, 2013). On the other hand, “creation” refers to unifying and integrating multiple resources contributed by different actors (Saarijarvi and Kannan, 2013; Sjodin and Kristensson, 2012). Co-creation replaces the hierarchical approach to management and the linear approach to innovation, affording all stakeholders the possibility to influence and bring forth meaningful and relevant solutions in a collaborative environment (Kirah, 2009). Some studies argue that it is the creation of value in a more interactive process in which customers and firms work together to generate new products and services (Ind and Coates, 2013; Skiba and Herstatt, 2009). The nature of value-creation relies on the approach we take toward it; if the customer is invited to participate in the co-creation process, it is the firm that creates value for customer (Zwass, 2010). Therefore, co-creation is defined as developing new products and services in a quicker and more relevant and innovative way than traditional processes which it brings about an opportunity for continued interaction between the firm and customers and the firm is willing to work with external stakeholders (Wandahl et al., 2011; Sawhney, 2006).

Each value creation process (customer and provider) developed during the direct interaction, merge into one integrated dialogical process in which both parties operate within the processes of the other and have the opportunity to be active, coordinate actions, and learn from each other. This eventually leads into a direct influence from each party on the other (cf. Ind and Coates, 2013) which indicates that the interactions necessitate a deep engagement from both the customers and providers and the ability and willingness of both to act and learn from the other (Prahalad and Ramaswamy, 2004a; 2004b; 2004c; Prahalad and Krishnan, 2008). In such processes, companies deliver value as a customer’s partner instead of seller (Khajehheian, 2016a). The company-customer relationship in the traditional product business approach is transaction based, therefore the financial value is assumed to be the transaction itself (Prahalad and Ramaswamy, 2004b). However, in co-creation

approach, it is the set of interactions and the developing relationships that drives the financial value (Payne, Storbacka and Frow, 2008). As a result, the value is co-created through a continuous interactive learning process and customer is involved in all the stages of service development; from joint problem definition to collaborative problem solving. Consequently, the customer value creation process is assumed as a non-linear, interactive, dynamic, and often unconscious process (Payne et al, 2008; Plötner, Lakotta and Jacob, 2013).

Innovation capability

Innovation activity in the firm involves the interaction between three key aspects of the firm's operations. These includes the resources of the firm including knowledge, process and product, the firm external linkages with societal and market changes (Khajehieian, 2014), and the creative input of individuals in the firm (Balan, Lindsay and O'Connor, 2009). Tapping the potential of new ideas is the basis of competitive success (Francis, 2005). First time, Schumpeter (1934) addressed the importance of innovation for economic and organizational performance (Balan et al., 2009). Balan and Lindsay (2010) have resulted that the post-industrial era with increasingly complex, turbulent environment, organization will need to focus on increasing degree on innovation and ensure the survival and progress of firm (Khajehieian, 2016b). In this regard, given the large number of recent studies have identified a positive relationship between innovation and firm performance (Slater, Mohr and Sengupta, 2014; Aravind, Damanpour and Devece, 2013). Organizations exploit opportunities and gain competitive advantage through Innovation. As a result, Innovation and competitiveness are in relation with each other (Balan and Lindsay, 2010).

However, Innovation solely is not enough for doing competitiveness and firms need to be in a continuous process of innovation to utilize opportunities (Menguc et al., 2014). Szeto (2000) defines that innovation capability is the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders. Lawson and Samson (2001) believe that innovation capability is not only an ability to be successful at running a business new stream, or to manage mainstream capabilities but synthesizing these two operating paradigms. Chen and Xu (2009) define innovation capability as a process that enterprises acquire and integrate knowledge to generate creative ideas and new product to satisfy customers. Balan and Lindsay (2010) argue that innovation capability involves the interaction between three key aspects of the firm's operations. This include different type of resources like as knowledge, process and products/ services, the firm's external linkages with societal and market changes and the creative input of individuals in the firms.

Firm Performance

Firm performance is one of the most important concepts of business strategy (Santos and Brito, 2009), and is one of the most relevant constructs in the field (Santos and Brito, 2009; Camisón and Villar-López, 2014). Performance is often operationalized with financial measures are often used alone regardless the growing importance of others environmental aspects and many studies represent firm performance as unidimensional even acknowledging its multidimensionality (Santos and Brito, 2009). As this regard, Firms that provide more utility to their stakeholders are better able to retain their participation and support and stakeholders depend on both the firm and its other stakeholders to satisfy their own interests (Harrison and Wicks, 2013). Garcia and Calantone (2002) describe innovations in three terms: First, new to the industry supports technology pervasively transforms an industry, second, new to the firm relate to those that may exist presently in the marketplace and finally, new to the consumers have impacts on users depending on the degree of learning and adoption.

Co-Creation and Innovation

Co-creation is defined as collaborative work between a consumer and a firm in an innovation process, whereby the consumer and firm engage in the activity of co-ideation, co-design, co-development and co-creation of new products or services (Prahalad and Ramaswamy, 2004c; Russo-Spena and Mele, 2012). In part, co-creation is a specific form of user contribution whereby “active” as opposed to “passive” consumers participate with the firm and voluntarily contribute input (be that knowledge, informed opinions, experience or resources) into an innovation process, whose outcome is better and more market-focused innovation (Russo-Spena and Mele, 2012)

The users’ ability to innovate is improving radically and rapidly as a result of the steadily improving quality of information technology, improved access to easy-to-use tools and components for innovation, and access to a steadily richer innovation common (Magnusson, Matthing and Kristensson, 2003). These information-based tools can be run on a personal computer, and they are rapidly coming down in price. As a consequence, innovation by users will continue to grow even if the degree of heterogeneity of need and willingness to invest in obtaining a precisely right product remains constant (Maklan, Knox, and Ryals, 2008). Von Hippel (2005) depicted that both firms and individual consumers are increasingly able to innovate for themselves, this is to say, innovation is being democratized.

H1 Co-creation has a direct, positive effect on innovation capability.

Innovation Capability and firm performance

Linkages between Innovation capability and firm performance is emphasized by large number of researches (Damanpour and Evan, 1984; Aravind et al., 2013). Most of the studies analyze how innovation performance—innovation as output—or technological effort for innovation—innovation as input—affect firm performance. A smaller group of studies based on RBV focuses on the analysis of Innovation capability—innovation as organizational capability—and its effect on (Camisón and Villar-López, 2014). Damanpour and Aravind (2011) display innovation capability as new approaches in knowledge for performing management functions and new processes that produce changes in the organization's strategy, structure, administrative procedures, and systems

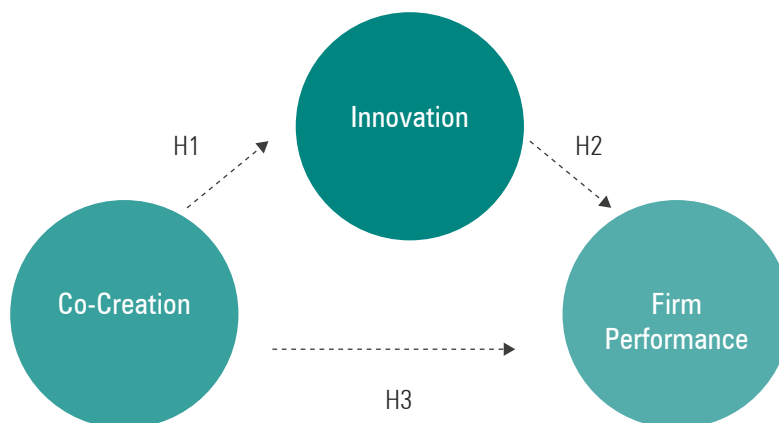
H2 Innovation capability has a direct, positive effect on firm performance

Cocreation and firm performance

According to Chathotha et al. (2012) co-creation is a process in which high level of participation by and collaboration of customers with companies is required for customizing and innovating new products and services. It is the participation of customers in creating the main product which is accomplished through innovation and is tied closely to usage, value-in-use and the conception that “value can be determined only by the customer”. Roser, DeFillippi and Samson (2013) argued that all co-creation approaches have two common qualities: the widening of organizational boundaries and the involvement of co-creators. They concluded that firm performance usually use a pool of ideas and strategies and has its own unique approach in co-creation which is specific in its aim to increase the productivity of a firm's performance. Co-creation is an interactive dialogue between a firm performance and a group of consumers (Russo-Spena et al., 2011; Piller, Ihl and Vossen, 2010; Nicolajsen and Scupola, 2011), that can vary in depth of interaction, with the goal of jointly enhancing the value of the offerings to both the firms and the consumer (Magnusson et al., 2003; Maklan et al., 2008). The connection between the stage in which a firm get involved in co-creation and improvements in firm growth and profitability has been widely discussed (Prahalad and Ramaswamy, 2004b; Prahalad and Krishnan, 2008; Nicolajsen and Scupola, 2011; Macdonald et al., 2011; Lugosi, Janta and Watson, 2012). Firm Performance is the extent in which a firm is capable of reaching sustained competitive advantages as leveraged by resources that are valuable, rare, and imperfectly imitable and have no strategically equivalent substitutes. All these researchers on co-creation suggest or imply a relation between co-creation and firm performance in their articles, but rarely fully conceptualize it (Tijmes, 2010).

H3 co-creation has a direct, positive effect on firm performance

Figure 1. Illustrates the theoretical relationships between co-creation, innovation and firm performance.*



*Hypothesized model.

METHODOLOGY

Data collection

This is an applied research which is conducted based on descript survey research. The population of respondents included middle manager like as R&D manager, innovation manager, sales manager, human resource manager or consular. These respondents are from the top 500 Iranian Large Enterprise that are selected from the ranking account of the Industrial Management Institute (IMI). The population was 500 enterprises, but based on Cochran's method, only 157 respondents were picked as the sample size representing a response rate of 31.4%. After excluding eight invalid responses, 149 valid responses remain. Simple sampling was used in this research. The first step in this study focuses on construct reliability and validity, whereas the second step tests structural relationships among latent constructs. The questionnaire survey was used to gather the data.

Statistical analysis

The study used structural equation modeling (SEM) and applies partial least squares (PLS) using Smart PLS 3.0 to assess the psychometric properties. PLS software were used for testing the basic conceptual model. They provide other indices plus goodness of fit evaluation of models.

Proposed model

Figure.1 presents the study's research model. The model suggests that co-creation affects innovation capability and firm performance, also innovation capability acts as a

mediator in the relationship between co-creation and firm performance. These linkages of all these constructs are taking into the model. In particular, it is going to examine the mediating role of innovation and its link strength in the impact of value co-creation on firm performance and also the direct impact of Co-creation on firm performance. In 4-1 and 4-2 section, we discuss the reliability and validity of model and its connections. Also, we show hypotheses in last of 2-4, 2-5 and 2-6 sections. As can be shown, the options of variables and their measurement scale is conducted by the theoretical premises that was discussed above, thus the model is provided with conceptual consistency. The three constructs are providing a number of questions which were selected specifically from the previous questioners, creating our measurement scale.

Measure development

In general, all constructs in the model were measured with multiple-item scales and well-validated. These measures were utilized in previous research. We measured Co-Creation using six survey items based on Payne et al. (2008). The stem question was "What is the role of following dimensions in your firm performance?" followed by three dimension: customer process (CC1 and CC2), encounter process (CC3 and CC4) and supplier process (CC5 and CC6). Our measure of Innovation capability (IC) was based on four items used in Aravind et al (2013). We used "Relative to your major competitors, your firm focuses on" as the original question. At last, a six-item scale was used to measure firm performance. It was drawn from Camisón and Villar-López (2014). Table 1 lists the questions that were used to construct our measures.

Table 1. Measures.

Construct	Indicator	Item
co-creation: What is the role of following dimensions in your firm performance? (1 = much below average; 2=somewhat below average; 3 = about average; 4= somewhat above average; 5= much above average.)	Customer learning	CC1
	Customer Relationship experience	CC2
	Exchange practice	CC3
	collaborative practices	CC4
	Supplier relationship experience	CC5
	Organizational learning	CC6
Innovation capability: Relative to your major competitors, your firm focuses on (Strongly Disagree=1, Disagree=2, Neither Agree or Nor Disagree=3, Agree=4, Strongly Agree=5):	Being the first in the industry to try new methods and technologies	IC1
	Using the latest technology in production	IC2
	Capital investment in new equipment and machinery	IC3
	Being a leader in process innovation	IC4

Table 1. Measures. Continued

Construct	Indicator	Item
firm performance: Evaluate your firm's performance compared to the average for your competitors on a scale from 1 to 5, where 1 equals Much worse and 5 Much better Note: Items are distracted from Tehran stock exchange and IMI in Iran.	Mean economic profitability 2011	FP1
	Mean financial profitability 2011	FP2
	Mean sales profitability 2011	FP3
	Return on total assets 2013	FP4
	Return on capital employed 2013	FP5
	Return on shareholders' funds 2013	FP6

Table 2 shows descriptive statistics such as Means and Standard Deviations. According to the descriptive statistical variables in each scale of 5 with the mean close to 3.5 and 4 and with standard deviation close to 1 it indicates a perfect distribution data. Based on the obtained results a positive relationship between variable is seen. It can be stated that there is a relative independence of the relationship between the variables of the study.

Table 2. Descriptive statistics (Means and standard deviation).

Variables	Mean	SD
CC (Co-creation)	3.60	0.82
IC (innovation capability)	3.50	0.77
FP (Firm performance)	3.60	0.72

Table 3 shows correlation matrix between variables. According to Farrar and Glauber (1997) if the correlation coefficient is in the range of 0.25-0.6, it means that the relationship is positive and there is a relative independency between the variables of the study. So, all variables are in the above stated ranges and have positive relationship.

Table 3. Correlation coefficient.

Variables	CC	IC	FP
CC (Co-creation)	1		
IC (innovation capability)	0.54	1	
FP (Firm performance)	0.58	0.54	1

STRUCTURAL MODEL RESULTS

In this section, first, the technical characteristics of the model including the reliability, convergent validity and construct validity will be evaluated and then the major and minor premises will be analyzed.

Construct Reliability and Convergent Validity

To assess the Construct Reliability, the composite reliability and Chronbach's Alpha will be used. The Cronbach's alpha should be above the minimum threshold (0.7), necessarily for exploratory research in agreement with Nunnally (1978). Composite reliability (>0.7) were used for testing reliability to test the reliability of the questionnaire. All of the constructs reach the level of acceptance to be able to affirm that the scale is trustworthy and is in the Table 4.

The Average variance extracted (AVE) index will be used to determine the convergent validity. Average variance extracted (AVE) was used for testing Convergent validity of the research results. Minimum acceptable Average variance extracted is 0.5 (Adcock and Collier, 2001). Table 4 represents the AVE. In this research AVE is greater than 0.5 and CR is greater than AVE, therefore all the constructs in this study are valid.

Table 4. The Average Variances Extracted, composite reliability and Cronbach's Alpha.

Construct	Average Variances Extracted	Composite Reliability	Cronbach's Alpha
CC	0.598	0.817	0.766
IC	0.575	0.796	0.734
FP	0.611	0.862	0.787

Construct validity

In order to study on the construct validity, it is obvious to examine the relevance of each of the indicators measuring variables. The items in the questioner are the measuring indicators and were considered to assess the variables. The minimum acceptable factor loading of each item is 0.4 and in significance level of 0.95 the T-values that are greater than 1.96 are accepted (Adcock and Collier, 2001). Table 5 represents T-values and Factor loading. Referring to the results indicators have factor loadings greater than 0.4. Therefore, it can be concluded that the indicators of variables can define the factors.

Table 5. T-values and Factor Loading of structural equation model.

Item <-Construct	Factor loading	T-value
q1 <-CC	0.6477	5.6187
q2 <-CC	0.8277	23.3345
q3 <-CC	0.8441	24.2898
q4 <-CC	0.7652	14.9687

Table 5. T-values and Factor Loading of structural equation model. Continued

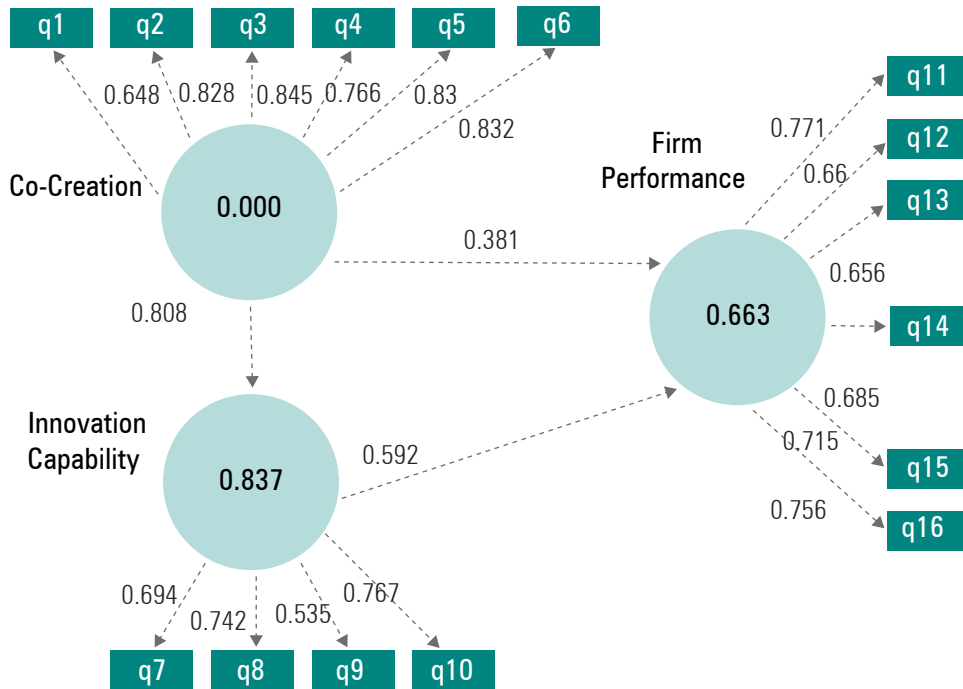
Item <-Construct	Factor loading	T-value
q5 <-CC	0.83	20.0911
q6 <-CC	0.8314	25.455
q7 <-IC	0.6938	9.3905
q8 <-IC	0.7419	11.4595
q9 <-IC	0.5355	6.0937
q10<-IC	0.7662	16.2374
q11<-FP	0.7704	18.2366
q12<-FP	0.66	6.3639
q13<-FP	0.6553	8.9703
q14<-FP	0.6842	9.5418
q15<-FP	0.7147	12.3195
q16<-FP	0.7558	17.4426

According to the achieved results, the quantity of T-values holds greater than 1.96 and are able to make clear their corresponding construct and considered in the final model.

Major and Minor premises

In this section, the quantities of T-values are checked for the model relations. These relations are approved when are greater than 1.96 at the 95 percent significant level. Also coefficients of their path shows the relevance among the variables. The Figure.2 shows the path coefficients of the model.

Figure 2. Standard coefficients of model.



Based on the gained results, the path coefficient between co-creation and innovation is 0.808. At the significant level of 95 percent and in consideration with the quantity of T-value greater than 1.96 the relationship is approved. Also since T-value 4.444 for the relationship between innovation capability and firm performance is greater than 1.96, and T-value 26.229 for the relationship co-creation and firm performance is above the defined criteria, so the relationship is approved. Also relationship between Innovation Capability and firm performance and co-creation and firm performance is approved.

Table 6. Significance of variables and path coefficients.

	Path coefficient	Std. Deviation	T-value
CC-IC	0.381	0.0876	2.159
IC-FP	0.592	0.1013	4.444
CC-FP	0.808	0.1147	26.229

Finally, we analyzed Total fitness of path analysis model, Tenenhaus et al (2005) believe that the following equation can be used for calculating model fitness:

$$GOF = \sqrt{\text{communality} \times R^2}$$

$$GOF = \sqrt{0.75 \times 0.53} = 0.63$$

Since the minimum acceptable level for this indicator is 0.36 (Akin, bloemhof-Ruwaard, & Wynstra, 2009) and the value of this indicator is 0.63, we conclude that the model has appropriate fitness.

CONCLUSION

The result of structural equation modeling demonstrated a T-value of 2.159 for co-creation at significance level of 0.95. Since the result is greater than 1.95, the relation between co-creation and innovation capability is accepted. Therefore referring to path coefficient of 0.0381, co-creation affect innovation capability in large company. The result of structural equation modeling demonstrated a T-value of 4.444 for innovation capability at significance level of 0.95. Since the result is greater than 1.95, the relation between innovation capability and firm performance is accepted. Thus, referring to path coefficient of 0.592, innovation capability affects firm performance in large company. The third hypothesis was about impact of co-creation on firm performance. The result of structural equation modeling demonstrated a T-value of 26.229 for co-creation on firm performance at significance level of 0.95. Since the result is greater than 1.95, the relation between co-creation and firm performance is accepted. Therefore referring to path coefficient of 0.808, characteristics of co-creation affect firm performance in large company. Thus it can be claimed that co-creation affects firm performance more than the other factor in the sample society. Due to the structure, type and method of partnership, the dimensions have similarities and differences from other studies. Other studies (e.g Payne et al., 2008; Silva et al., 2013) emphasized on the need to development of models of innovation in co-creation. Current study has concluded that impact of co-creation on firm performance is greater than its impact on innovation capability.

LIMITATIONS AND FUTURE RESEARCH

The study has some limitations; much work remains in the co-creation field. First, the samples in the study are Iranian's companies; thus, generalization of the results to other samples cannot occur without some caution. Second, the data are cross-sectional and not longitudinal. Finally, some middle managers don't incline to answer.

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