

MEDIATING ROLE OF SUPPLY CHAIN INTEGRATION AND INTRAPRENEURSHIP BETWEEN INFORMATION TECHNOLOGY INFRASTRUCTURE AND FIRM PERFORMANCE IN THE IRANIAN PISTACHIO INDUSTRY

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ABSTRACT

The idea behind this research is to build up and empirically analysis a model which serves to explain how the Supply Chain Integration (SCI) and Intrapreneurship capabilities affect and improve firm performance. A quantitative survey method was adopted to gather facts and figures for the development of proposed model. Using a cross-sectional survey method, the data was gathered from 274 Pistachio companies in Iran, based on stratified sampling. Hypothesized relationships were examined using the Partial Least Squares Structural Equation Modelling technique (PLS-SEM). The results of the study highlight the positive effect of SCI and intrapreneurship on Firm Performance (FP). Moreover, this study makes several theoretical and empirical contributions and provides further insights on SCI and intrapreneurship and outcomes of FP particularly in Iran.

Keywords: Supply Chain Integration, Intrapreneurship, Information Technology Infrastructure, Firm Performance, Iranian Pistachio Industry.

INTRODUCTION

Integration in supply chain is considered as an integrated objective to plan, implement and also control flow of different data, information and services from both component suppliers and raw material. This involves producing finished goods for customer relationship collaboration, planning, service or product launch, order delivery, operations and manufacturing plan and control, life-cycle support, supplier relationship collaboration as well as reverse logistics and its relevant risks. Such processes that utilize a mixture of technology, systems and people could be accomplished by the organization itself or through cooperation with external partners in supply chain by techniques such as outsourcing. Another key factor relevant to intrapreneurship in path of supply chain integration is IT infrastructure. The progress in information technology, in recent decades, has quickly transformed the ways of doing business around the world. IT has resulted in increased performance of the partners in the supply chain with its power to deliver precise, timely and reliable information (Hanif and Irshad, 2018). IT has

been acknowledged as an uncertain factor in the improvement of SCM as infrastructure assistance inside the organization itself as well as within its upstream (Koh and Saad, 2006). In the business world, the use of IT has drawn increasing attention in managing the supply chain process (Wu et al., 2006). Intrapreneurship includes many different dimensions and some of the widely studied variables of this construct are innovativeness, risk-taking, competitive energy, proactive and also its self-renewal (Dess et al., 2003; Atari and Prause, 2016). Therefore, their relationship with corporate performance so far has not been discussed efficiently (Antoncic and Hisrich, 2001; Felicio et al., 2012; Atari and Prause, 2016) so this research will remedy this gap by using four of the most common and influential aspects of intrapreneurship including innovativeness, risk-taking, competitive energy, proactive and also its self-renewal. Current investigation has assumed IT as a necessary antecedent for intrapreneurship which has not been studied in previous research studies (Amado et al., 2010; Zhao et al., 2011; Hanif and Gul, 2016).

Research Objectives

The purpose of this study is to develop and empirically test a model explaining how SCI and intrapreneurship capabilities affect and improve firm performance. Major research objectives are to investigate the effect of IT infrastructure on firm performance, supply chain integration, intrapreneurship; to investigate the effect of supply chain integration on firm performance, intrapreneurship; to investigate the effect of intrapreneurship on firm performance and to investigate the mediating role of intrapreneurship and supply chain integration between IT infrastructure/supply chain integration and firm performance.

Research Gap of Study

Being encouraged by such new challenges, this study investigated a set of different collaboration and coordination issues, by focusing on role of information technology and relevant technologies in enabling and helping intrapreneurship and supply chain management. It emphasized the importance of innovation regarding channel integration among partners of supply chain as they cooperate to each other to develop new customer values as a result. Therefore, the main goal of this study is to formulate an intrapreneurship model and conceptualize the relationship between phenomenon and prerequisites of intrapreneurship as well as their collective effect on organizational results in Pistachio industry of Iran. The main goal would be achieving better knowledge on role of intrapreneurship regarding outcomes of organizations in Pistachio industry through building a conceptual intrapreneurship model in this industry. There are still a few research studies that have comprehensively and theoretically analyzed the role of supply chain on intrapreneurship (Silvestre, 2016; Ashrafganjouei and Abu-Bakar, 2015) and intrapreneurship on firm performance (Atari and Prause, 2016; Hanif and Gul, 2016; Stokvik et al., 2016). Moreover, explanation on the influence of supply chain integration on firm performance directly and through intrapreneurship is not documented well. In addition, still there are few related finding that have examined the interactions among the aforementioned antecedents of intrapreneurship and their effect on SME's firm performance (Atari and Prause, 2016; Verreynne and Meyer, 2015; Amado et al., 2010).

LITERATURE REVIEW

Small and Medium-Sized Enterprises (SMEs)

Small and Medium-sized Enterprises (SMEs) are a remarkably heterogeneous category of business, which forms a critical part of economy in both developing and developed countries. These days it is considered that SMEs have a key role in economic development and growth of countries. There is an extensive consensus that regardless of their size, they can generate more job opportunities in comparison to large size companies and are a necessary driver for innovation and growth. SMEs are currently taking a remarkable part in global business context through connecting many interrelated supply chains (Hvolby and Trienekens, 2002; Hanif and Shao, 2018). Moreover, entry of many new SMEs significantly affects market structure development and its performance. Globally, SMEs sector significantly helps the economy *via* its services and different products and form a unique part of developing economies. For instance, SMEs contribution to economic fundamentals is different in various countries: from 16% of GDP in countries with lower income levels to 51% of GDP in countries with higher income level. SMEs assumed for a broad amount of organizations in most of the economies and so significantly contribute to GDP of the countries, national employment and export. This sector has a key role as an engine for the developing economies and job sources as well as innovation and entrepreneurship.

Resource-Based Theory

As a theoretical background, this study draws upon the dynamic capabilities of Resource-Based View (RBV), reflected through the integration of intrapreneurship and supply chain. The fundamental premise of resource-based view is that companies should be studied according to their resources; if these resources could be considered as Valuable, Inimitable, Rare, and Non-substitutable (VIRN) so they will be grouped as those capabilities which enable the competitive advantage of an organization. RBV has achieved high attention by many academics in a business context.

Firm Performance

These days, business firms are dealing with a complex and highly competitive marketplace. A single firm cannot guarantee its success in today's business area alone it needs the supplying firms and delivery chain. The overall performance of an organization is demonstrated in actual output of organization in comparison to intended outputs of organizations, their objectives, and goals. There are some consistent measures and definition of firm performance which are important in assessing the degree of effectiveness, competitiveness, and strategies of organizations (Hanif and Gul, 2016). In general, performance variability is based on unique resources and abilities, which are not substitutable, imitable and are valued and rare. Moreover, an organization's competitive advantage could be continued just if it employs a strategy, which simply could not be imitated by rivals. In a company, how to monitor the resources in developing and keeping competitive advantage has achieved high attention from

marketing experts who have many different kinds of market-based properties (Srivastava et al., 1998) and abilities with total firm performance (Srivastava et al., 2001; Wu et al., 2006).

Entrepreneurship

Cantillon was the first theorist to present the entrepreneur's role in economic environment in 1755 (Felicio et al., 2012). Cantillon assumed entrepreneur as the person who undertakes opportunity and brings certainty for suppliers when considering the risk rather than profit. The core dimension of entrepreneurship has been seen as an interest to accept uncertainty according to (Casson, 2002). As explained by Casson (2002) it might be concluded that all the state inhabitants are dependent and they could be grouped as two categories, hired people and undertakers. All of the undertakers are there with unfixed wages as compared to others with fixed wages; according to their functionalities and unequal ranks. The General who has his payment, the Courtier who has his pension or the domestic servant who has some wages all will be categorized in first group. The others who remain are the undertakers whether setting up with capital to run their enterprise or are known as their own labor with no capital and they might live with ambiguity. At the time that some experts believe that entrepreneurial qualities could not be instilled in their staffs (Hanif and Shao, 2018), it appears to be a common consensus in academic context that entrepreneurial affairs could be generated by staffs (Thornberry, 2003).

Intrapreneurship

According to Christensen in mid 1980s, book of Pinchot (1985) on intrapreneurship contributed to consider intrapreneurship as a specific topic of study from entrepreneurship. As Pinchot explained, the intrapreneurs' actions will assist to meet innovation voids in business's life cycle in different organizations (Pinchot, 1985). The entrepreneurship concept empowered the idea that entrepreneurial behaviors can precede organizational contexts but intrapreneurial behaviors are dependent on organizational context. Corporate evolution is represented by intrapreneurship in which the main emphasis will be on individual behaviors on constraints, bureaucracy and the need to promote operational conditions. In particular, the focus on intrapreneurial behaviors is becoming more obvious as firms provided many approaches for change. Intrapreneurship is the act of showing entrepreneurial qualities inside firms (Kuratko et al., 1990). In general, intrapreneurship in academic studies is known as employees who show entrepreneurial qualities in companies (Kuratko et al., 1990) and those staffs who do not obey status quo. Still, intrapreneurs generate value for their organizations through creating changes in internal and external context of their organizations. Intrapreneurship could take place at all of the organizational levels and can happen in formal ways (Zahra, 1993) or informally. The construct and measures of intrapreneurship have been adapted in this study.

Understanding Supply Chain Process Integration

Previous studies explained that external-internal insights, as well as a process view of supply chain, are important. SCM is strategically a competitive advantage source. Having effective management of supply chain is important for organizational growth (Arana-Solares et

al., 2010). The total process of the supply chain, ideally, should be managed, designed and monitored as a unit in general (Bagchi et al., 2005). In addition, supply chain integration is a key factor in the strategy of SCM. The SCI includes three main dimensions, which are the integration of organization with its suppliers, integration of organization with its customers and internal integration in the supply chain. Currently, producers should not only focus on their firms but rather should participate in the management of upstream and downstream company's network. Companies should realize how to integrate externally and internally both; which is with suppliers and customers. Such integration efforts are critical to lean initiatives in which both the coordination and collaboration with suppliers and customers both are necessary and vital (Shah et al., 2002; Jones et al., 1997).

Information Technology Infrastructure

IT is considered as a critical prerequisite for arranging such networks and is related to the enhancements of substantial supply chain efficiency (White and Pearson, 2001). The empirical study, assessing the way through which IT is utilized for SCM objectives, is limited even though the IT significance for having effective SCM is identified extensively. Most of the previous studies in general, have been devoted to presenting the advantages of inter-organizational IT or information sharing or measuring the impacts of specific technologies on productivity of supply chain. Hence, the reasons for using IT in a certain way besides the regular implementation of IT in SCM will remain ambiguous. Through giving permission to firms to use new ways of cooperation, IT made them enable to paradoxically compete. Different producers are moving their affiliations with their partners in supply chain away from relationships generated by competitive reasoning into collaboration.

Development of Theoretical Models of Supply Chain Capabilities

The main emphasize of this part of study is to examine those investigations and models that describe organizational performance variables including SCI, IT and intrapreneurship. In start this research has outlined models of organizational performance variables that are relevant to formulated framework of this research. Secondly some of the drawbacks of these formulated models have been mentioned. Finally, the presented models are from the previous studies are utilized to design the framework of this research.

Conceptual Framework and Development of the Hypotheses

The suggested conceptual framework of current research, according to RBV of an organization, include SCI, IT infrastructure, organizational performance and intrapreneurship related to RBV, this research explains that internal resources of IT increase internal channel abilities and improves capabilities in order to impact organizational performance (Byamugisha and Basheka, 2016). In order to support this framework, in a study asserted that organizational resources result in competitive achievements and Collis (1994) asserted that different organizational abilities are the reason for competitive achievements. Moreover, Amit and Schoemaker (1993) noted that capabilities usually are being set up in functional zones or through

merging physical, technological and human resources at corporate level. In addition, they explained that resources, people and information are combined and sequenced during time in order to generate specific competencies. Likewise, Grant (1991) supported this framework through understanding resources and abilities as the basis for organizational strategies and concluding that capabilities are dependent to resources. Organizational IT ability as noted by Rai et al. (2006), demonstrates a lower-order ability which could be impacted to create higher-order process ability for example SCI that is the foundation for significant and sustained performance aids for company. According to Sambamurthy et al. (2003), IT capabilities are predetermines of higher-order business abilities. Based on such logic, current study defines IT as those lower-order abilities, which could be impacted to improve higher order abilities for example SCI and intrapreneurship so have direct impact on organizational performance. The proposed framework of current research is illustrated in Figure 1 and explains that IT resources of an organization are employed to help company to channel some capabilities for example intrapreneurship and SCI and firm performance. As demonstrated in this framework, the improved capabilities result in optimum organizational performance.

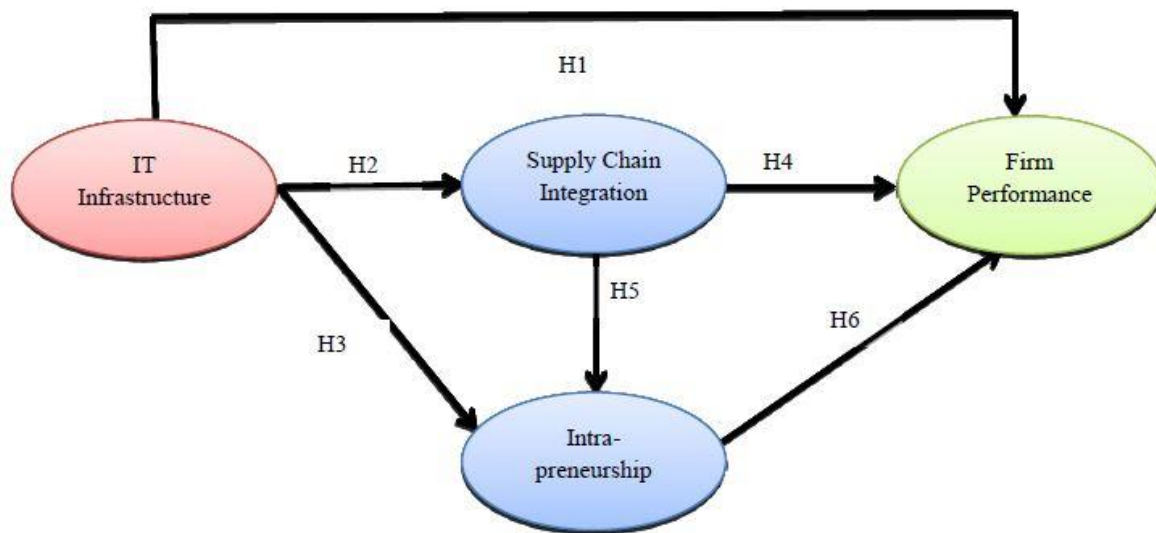


FIGURE 1
THE CONCEPTUAL FRAMEWORK OF RESEARCH

Consequently, this research contended that there is a noteworthy relation between information technology and firm performance that helps in formation of the following hypothesis:

H1: Information technology infrastructure has significant effect on firm performance.

This demonstrates that IT increases SCI and is reinforced additionally by transactional cost economies. This explains that cooperation and coordination between organizations is limited by transaction cost of arranging all of the communications (Stor et al., 2003; Stroeken, 2000). Productivity of market transaction reduces through increase in costs of transaction, which might lead to bigger market rates. Elements of transaction costs include bounded rationality, opportunistic behavior, uncertainty, transaction frequency and asset specificity. Since IT affects timely, reliable and accurate delivery of information, it suggests managers with convenient substitutes to old-style-head and low cost on communication which minimizes the uncertainty of information and transaction frequency. Similarly IT has been shown as an important mode of decreasing coordinating costs that cover transaction risk (risk of to be exploited in affiliation as well as integrated judgments costs. This research suggests that there is a significant relationship between information technology and integration of supply chain and below hypothesis is developed.

H2: Information technology infrastructure has significant effect on supply chain integration.

IT investment can make the business employees to reach information and cooperate with other departments and workers within an organization which they have not experienced before. It makes the employees capable of easily generating new ideas and also improves current product quality as well as generates more influential techniques for commercial launching in order to attract target customers and remove all of the unnecessary routines for cost minimization and task efficiency that is known as intrapreneurship. Besides, employees can utilize IT tools for example business intelligence and information management to access previously conducted research projects. Internet applications will help an organization to deliver their products and services to customers through new ways and suggest additional services or products (Koellinger, 2008). Besides, IT improvement in a company can improve the possibility of innovation by employees through available resources for them. Finally, the most innovative organizations are those, which mainly invest in IT infrastructure. It is the key promoter of intrapreneurship inside companies (Amado et al., 2009). Therefore, Current research postulated that there is significant relationship between information technology and intrapreneurship and formulates below hypothesis according to the mentioned points earlier.

H3: Information technology infrastructure has significant effect on intrapreneurship.

The extent to which information shares between companies and supply chain companions is known as information flow integration (Rai et al., 2006). Sharing the information within business units, as mentioned by Lee et al. (2007), among supply chain partners for instance other suppliers and strategic alliances is required to obtain three important relationships, which are internal linkage, supplier linkage and external linkage. Previous researches (Atari and Prause, 2016; Verreynne and Meyer, 2015; Brigic and Umihanic, 2015; Felicio et al., 2012; Prajogo and Olhager, 2012) demonstrated there are constructive relationships between integration and amount of information flow performance. Increasing the level of integration and information sharing (Kim, 2009; Gunasekaran and Ngai, 2004; Sezen, 2008), between supply chain partners is an important requisite for improving the supply chain efficiency. Hence, this research believed

that there is a significant relationship between SCI and firm performance and aims to examine the following hypothesis.

H4: Supply chain integration has significant effect on firm performance.

In previous literature, the Supply Chain Integration and environment has been measured as a determinant of entrepreneur, entrepreneurial behavior at individual as well as organizational levels. Scholars developed contingency models and forecast intrapreneurship, besides external and internal environmental factors. In case of affecting the corporate entrepreneurship, the external context (SCI) is one of the very critical determinants (Zahra, 1991; Dess et al., 2003). SCI has positive and direct impact on intrapreneurship (Atari and Prause, 2016; stokvik et al., 2016). In addition, Pitt (2009) explained that intrapreneurship initiates in SMEs in order to increase firm performance *via* SCI in agricultural industry of Iran. Thus, this research argued that there is a significant relationship between SCI and intrapreneurship and attempts to study the following hypothesis.

H5: Supply chain integration has significant effect on intrapreneurship.

Besides, companies, which attempt to obtain intrapreneurship, also will develop more innovative ideas. Innovation process includes developing or improving production methods, administrative or service operations. Effective process innovation might increase responsiveness and organizational efficiency that might as a result increase market share and sales volumes. If there is more developed intrapreneurship so, there will be better firm performance. The more developed the intrapreneurship is, the greater will be the improvement in firm performance. Therefore, this study postulated that there is a significant relationship between intrapreneurship and firm performance and intends to investigate the following hypothesis:

H6: Intrapreneurship has significant effect on firm's performance.

One of the most common arguments among IS researchers is the fact that if IT affects firm performance indirectly or directly. This study is based on point of view regarding to IT enabled organizational abilities to influence firm performance positively and indirectly through higher-order process i.e. intrapreneurship and supply chain integration. Previous studies demonstrated organizational capabilities for example purchasing practices has a mediating role in relationship between firm performance and IT through considering the importance of IT resources in forming the innovative abilities of a company (Tarafdar and Gordon, 2007). The notion that intrapreneurship has been also suggested as a capability which can create business value (Mithas et al., 2003; Chandler et al., 2000), this study explain that the influence of IT infrastructure on firm performance can be mediated through SCI and intrapreneurship capability. A company in general cannot increase its market share only through investing in managerial and technological resources relevant to IT because they can be acquired easily and then imitated by competitors. Investing on innovation as one of the important parts of intrapreneurship is an important strategic factor for organizations that attempt to be successful in their business. According to importance of IT infrastructure in improving the organizational innovation

(Tarafdar and Gordon, 2007), current research explains that the relationships between firm performance, intrapreneurship and IT infrastructure are a valuable and key research topics (Amado et al., 2009). Therefore, this study postulated that intrapreneurship has significant mediating effect on the relationship between IT infrastructure and firm performance as below:

H7: Intrapreneurship has mediating role between IT infrastructure and firm performance.

H8: Intrapreneurship has mediating role between Supply chain integration and firm performance.

Integration of supply chain is one of the most critical supply chain management dimensions and many studies have been conducted on its enablers and results extensively. In addition, SCI could be identified as the extent to which a company can collaborate strategically with its supply chain companions. Likewise manage inter and intra-organizational activities to obtain efficient and effective flows of information, services, products, money and also decisions to bring out the best value for final customers quickly and with minimum costs (Frohlich and Westbrook, 2001). It could be concluded that SCI is an important factor for having successful supply chains and as a result successful firms. Recent studies emphasized on direct impacts of IT infrastructure on organizational performance by mentioning that these impacts are being mediated by other abilities (Sambamurthy et al., 2003; Rai et al., 2006; Wu et al., 2006; Mithas et al., 2003). For instance, as Norek and Pohlen, (2001) argued, information systems affect organizations by having complementary relationships with capabilities and assets of other companies. According to previous studies (Rai et al., 2006) integration of supply chain plays a mediating role between organizational performance and IT infrastructure (Atari and Prause, 2016; Stokvik et al., 2016; Silvestre, 2016; Ashrafganjouei and Abu-Bakar, 2015). However, regardless of its importance, SCI is one of the very recent concepts in studies. Moreover, it is discussed that IT capabilities usually affect organizational performance through enabling higher-order business abilities. Based on this idea, this research has been conducted upon perspective of dynamic capabilities and studies the impacting mechanism of IT infrastructure. Particularly, this investigation refers to Grant (1991) and Rai et al. (2006) in describing the IT infrastructure as critical abilities, which form the higher-order abilities (supply chain integration) which in turn affect organizational performance. Therefore, this study believed that supply chain integration has significant mediating effect on the relationship between IT infrastructure integration and firm performance as below:

H9: Supply chain integration has mediating role between IT infrastructure and the firm's performance.

H10: Supply chain integration has mediating role between IT infrastructure and the intrapreneurship.

RESEARCH METHODOLOGY

For current study, the cross-sectional design has been employed due to the reason that data has been collected at a certain time period. For the current research, the single cross-sectional instance has been used because only one single sample of participants is selected from whole population and information is achieved from this sample only for one time. To measure the research variables the survey instrument has designed, which are, IT, firm performance,

intrapreneurship and SCI. To do this, the questionnaire method was employed, because it was easy to distribute among various companies dispersed geographically at far locations. Besides this, it was easy to manage, low-cost and also ensured confidentiality and anonymity. The questionnaire was sent to respondents in firms who answered them by mail (post) or email.

The respondents of this study were top managers of SMEs. Therefore, the unit of analysis of this research was organizations (companies). According to the declaration of officials, the companies that active in this industry have disrobed in one provinces of Iran and number of them is 900 during 2013.

The number of companies active in this industry of this research (the population size) was 900. To acquire 95% level of confidence, this study needed 270 companies as sample size (n). In order to acquire sufficient number of samples after taking into account the possibility of the unreturned questionnaire, this study distributed more than 270 questionnaires. Furthermore, to decrease the sampling error it better uses large number of samples. Therefore, the sample of 360 companies was chosen to respond to the research objectives and the top managers in companies were responding to the questions. In this study, the sample selected based on the probability sampling technique that is less biased and offers the most generalization. The sampling strategy of this study combined the stratified and random sampling. Based on sampling frame and the research purpose, the researcher initially brought into account all the SMEs located in six cities in Iran (important cites which most companies active in this industry located there). After determining sample size, a stratified sampling was adapted (producers/distributors and exporters), in turn, the number of SMEs was determined based on the proportion of them regards to sample size. In next step with simple random sampling method, the name of SMEs selected from a list of companies in each industry type. As noted above targeted population includes 900 top managers (from 900 companies), sample size was 270 SMEs, but regarding the return rate of the questionnaire and based on previous studies that were investigated in Iranian agriculture industry, the response rate was ranged between 60% to 70% and this study with considering 65% response rate, had distributed 360 questionnaire.

90 questionnaires were distributed, more than sample size (sample size: $270+90=360$) to access minimum sample size. Of the 360 distributed, 305 surveys were returned, and 31 of the items unanswered, resulting in an effective sample of 274 usable completed questionnaires. This represented an effective response rate of 76 percent, and the sample was considered acceptable to conduct SEM analysis which was applied in this study (Table 1). The sample covered industry type that included producers/distributors and exporters.

Table 1
THE NUMBERS OF RESPONSE RATE

Industry Type	Number of Firms (Pistachio)	Proportion (%)	No of Questionnaire Distributed	Response Rate
Producers/distributors	585	65	235	158
Exporters	315	35	125	116
Total	900	100.00	360	274

The instrument of this research includes main sections which are demographics of respondents, intrapreneurship, organizational performance, IT and SCI. Moreover, there are 39 items included in the survey using a 7-point-Likert scale which ranges from low extent (1) to high extent (7). Referred to previous studies, an established and available instrument is utilized. Intrapreneurship is measured utilizing a 15-item instrument adapted from Antoncic and Hisrich (2001). To measure the firm performance, the 7-item instrument developed by Alfalla and Medina (2009). A 5-item instrument was used to assess IT based on the Vijayasathy (2010). The final section explores the SCI with 11-items adapted from Kim (2009). A summary of the constructs is shown in Table 2 as follows. Due to the companies distributed in different cities the questionnaire was administrated through the email. The survey instrument was developed based on the literature review. The questionnaire for this study was developed in English and then translated into the Persian language by a bilingual associate.

Table 2
COMPONENTS OF RESEARCH INSTRUMENT

	Elements		Number of Items	Source
	Variable	Dimension		
A	Intrapreneurship	Intrapreneurship	15	Antoncic and Hisrich (2001).
B	IT	IT Infrastructure	5	Vijayasathy (2010).
C	SCI	Supplier Integration	12	Kim (2009).
		Internal Integration		
		Customer Integration		
D	Firm Performance	Operational Performance	7	Alfalla and Medina (2009).
Total		39		

In this study, the coefficient of Cronbach alpha was applied to measure the the reliability of research constructs. In this section (before real research) of research, content validity was performed and after data collection of main research. The content validity, by concentrating on the queries of the test, varies from the the criterion-related validity and construct that correlates other measures of performance with the test scores. After the prepared final instruments, a panel of experts was established to determine the validity of the 39 items in this research. The researcher invited from three Iranian academics to check the appropriateness, arrangement, and the format of the content and the language employed in the instrument. The panel for appropriateness and clarity reviewed all 39 items in the questionnaire. In this research for convergent validity of research constructs, the loading factor, AVE, and Composite Reliability (CR) had been used. In this study, two measures of discriminant validity were employed namely the Fornell-larger criterion and the cross-loadings (Henseler and Fassott, 2010; Henseler et al., 2009). Therefore, in order to ensure discriminant validity, in Fornell-Larcker criterion, the AVE of each of the latent variables should be greater than the squared correlations in the presence of all other latent variables. For the current research, 30 organizations have been chosen through

convenience sampling method. This method has been used for sampling because in exploratory levels of some studies, for example, pilot study, a non-probability sample might be practical even though it does not allow determining the extent of the problem.

Accordingly, after minor revisions of the instrument in the pretest, a pilot-test was performed. For the pilot study, choosing small sample size is consistent with existed guidelines in previous studies that suggested a sample size of pilot study should be in general small and for example maximum 100 participants or a number between 10 to 30 individuals. For the pilot study of the developed instrument, the questionnaire has been distributed among respondents in operating pistachio companies (exporter/distributor and manufacturer) through email attachment.

Those individuals, who participated in the pilot survey, were not included in final data collection process because their behavior would influence the instrument while they again participate as a respondent of the study. In this research, descriptive and inferential statistics will utilize. The data collected from the survey was analyzed and utilized the statistical software of SPSS and other software to run CB-SEM such as AMOS. In order to examine the predictive capability of this theoretical model, SEM and more specifically PLS was utilized to assess the relationships between different constructs and to test both structural and measurement parameters in a proposed model of the structural equation. Choosing PLS was due to examining the proposed theory; because of nature of current research and also level of complexity and size of the model. The scholar prefers to utilize SEM base variance technique (PLS) in order to analyse the collected data.

RESULTS AND DISCUSSION

Descriptive Statistics about Reported Demographic Data

The rate of response was equal to 76%. 100% of participants in terms of their organizational positions were all top managers. Achieved results from the pilot survey were satisfactory and demonstrated that this survey instrument is valid and reliable in order to be applied in data collection process. Through email survey technique the data collection has been accomplished. In the first level of analysis, the obtained data was screened via statistical methods including outliers, missing data, homoscedasticity, normality as well as non-response biases. The missing data amount was few (0.5%) for the item-level and test of Little MCAR demonstrated that missing data partners were at random totally, so the solutions to solve missing data issue have been ignored. In addition, z-scores revealed that there is no univariate outlier. Finally, the collected data has been examined for any non-response bias from participants by means of Mann-Whitney-U test between late and early participants. All of the achieved findings were insignificant that means there is no difference between responses provided by late and early participants.

Then examining and evaluating the formulated model has been conducted through Structural Equation Modeling (SEM) having a two-step method. In the first step, the model of measurement was assessed in order to understand constructs and items reliability, convergent validity and discriminant validity. The outcomes showed that the constructs of this model are well fitted with the underlying items of measurement; so 5 of items were omitted in this step.

In next step, the structural model has been assessed in order to test hypothetical relationships developed in the framework. The criterion of the model fitted R^2 and explained that this model is well fitted with data at a moderate level. The maximum variance between key construct identified by independent construct to the dependent factor IP was equal to ($R^2=0.510$) and the variance which predicted last dependent factor (FP) by the independent factor is $R^2=0.513$. From 10 paths, which suggest 10 hypotheses, 1 of them was not significant while 9 of them were significant and positive.

The full-scale data were collected during December 2014 to February 2015. Total, 360 surveys questionnaires were distributed into 360 SMEs active Pistachio companies in Iran. In terms of the position in the company, about 100% was a top manager. The aim of this question was to make sure that respondents have an authority/managerial position to answer the questions. Majority of SMEs (62.7%) belong to producer/distributor companies.

No	Items	Number
3	Number of questionnaires distributed	360
4	Number of return questionnaires	305
5	Return rate	84%
6	Number of usable questionnaires after screening data	274
7	Percentage of usable rate	76%

Table 3 indicated that the return rate of questionnaires was 84% and percent of usable rate is 76%. At first, collected data coded, sorted, analysed, and then classified. The analysis of data was a reflection of the research questions. The results of the data analyses were organized into the following sections.

The Table 4 indicated that distribution of all data (for research constructs) are normal (-2 to +2).

	N	Std deviation	Skewness	Kurtosis
FP	274	0.68937	-0.236	-0.531
IT	274	1.32686	0.335	-0.395
IP	274	0.97482	0.415	0.151
SCI	274	0.93126	0.245	0.110

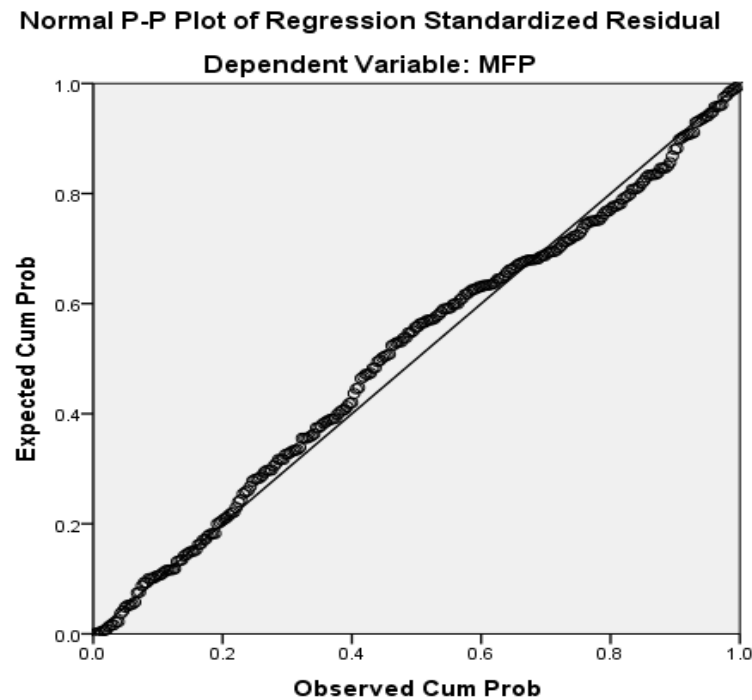


FIGURE 2
NORMAL P-P PLOT OF REGRESSION STANDARDIZED RESIDUAL

Multivariate normal P-P Plot of Regression Standardized Residual tolerance impact and VIF have been calculated by means of multiple regression analysis together with collinearity diagnostic option (Figure 2). All of the achieved findings explain VIF was equal to 2.006 which mean there is no Multicollinearity in independent factors.

Table 5
DESCRIPTIVE STATISTICS ON UNDERLING MAIN RESEARCH VARIABLES

	Variables	Mean	Std. Deviation	T	Sig. (2-tailed)
1	FP	3.51	0.68	-2.746	0.006
2	IT	3.71	1.32	2.741	0.007
3	IP	3.56	0.97	7.871	0.000
4	SCI	3.94	0.93	4.034	0.000

Note: Mean scores are based on a 7-point (1-7).

Table 5 presented mean values and standard deviation (std.) of the mean of each main variable. SCI has a maximum mean (3.94) and FP has the lowest mean (3.51). The mean of SCI is (3.94) and it is more than mid-point (3.5). This mean reveals that in the perception of participants the integration between partners has high integrity. In another hand the results show based on participants answers the technology use are good (mean=3.71 and more than

midpoint=3.5). The intrapreneurship has important for companies with mean 3.56. Firm performance to their major competitors is not bad with mean 3.51. All mean of constructs are more than mid-point (3.50), as a result, the respondents agree with the factors that effect on firm performance and situation of these variables in Pistachio indutry in Iran. Besides, a t-test was conducted to compare the means of constructs with a medium level of the 7-point scale (i.e. 3.5) in order to offer more information on the status of the constructs. Figures 3 and 4 showed the initial PLS model to be tested in this study. The model has four main constructs that consist of Supply Chain Integration (SCI), Information Technology infrastructure (IT), intrapreneurship (IP), and Firm Performance (FP). Each construct has multiple indicators or item measurement. SCI has 12 indicators (customer 3, supplier 5, internal 4), IP has 10, IT has 5, and firm performance has 7 indicators.

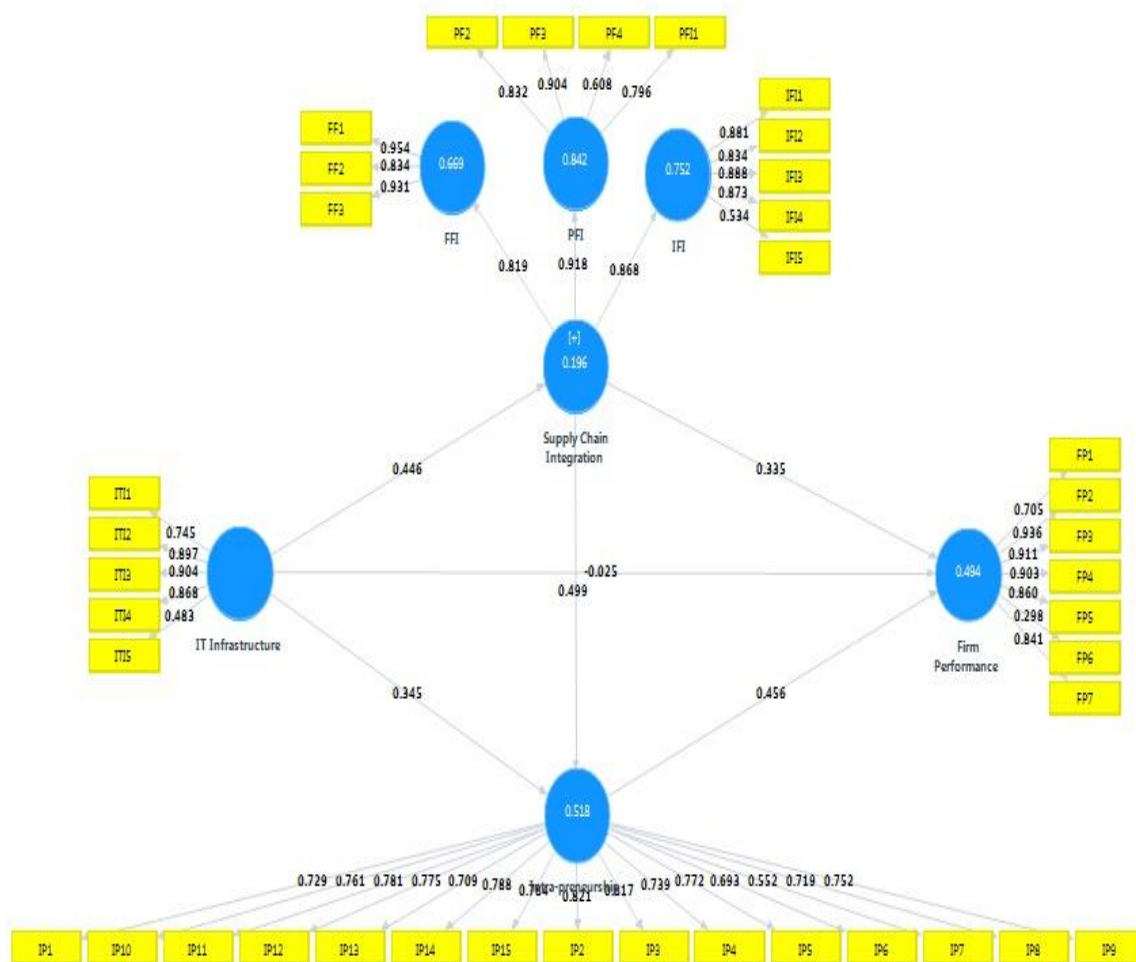
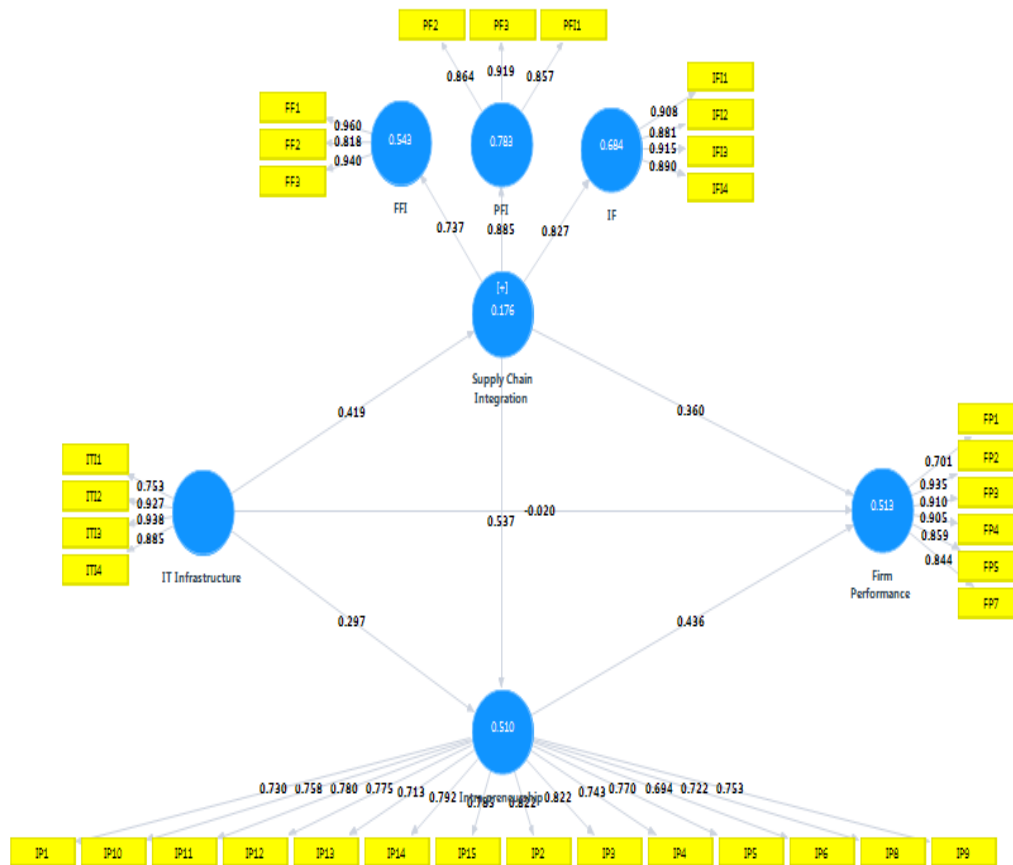


FIGURE 3
PLS INITIAL MODEL BEFORE REMOVING LOW LOADING INDICATORS

Referring to Table 6, it could be concluded that all of the indicators have values of indicator reliability which are higher than minimum accepted level equal to 0.40.

Constructs	Items	Cronbach's Alpha	Composite Reliability
IT	5	0.90	0.93
SUP	5	0.92	0.94
INT	4	0.85	0.91
CUS	3	0.89	0.93
IP	15	0.94	0.95
FP	7	0.93	0.95



**FIGURE 4
PLS MODEL WITH ITEMS LOADINGS FOR EACH CONSTRUCT**

Assessment of Structural Model

The coefficient of determination (R^2 value)

The coefficient determination (R^2) demonstrates variation percentage independent factor(s) defined by an independent factor(s). As noted by Alfalla and Medina (2009), R^2 demonstrates a level of explained variance of latent constructs and as a result, can evaluate “goodness of fit” of regression function in opposite to empirically achieved observed items. R^2 value varies based on a number of measuring independent factor (s) such as more number of independent factors should generate more R^2 value and vice-versa. Furthermore, according to Huang et al. (2010) model having R^2 equally 0.67, 0.33, and 0.19 are considered as substantial, moderate, and weak respectively. Table 7 indicates that FP ($R^2= 0.513$), IP ($R^2= 0.510$), have moderate R^2 and SCI ($R^2=0.487$) has weak R^2 . Following the criterion of (Huang et al., 2010) model is considered to be substantial fit. Furthermore, the blindfolding findings showed that for this model all of the constructs had high values for a CV_Redundancy index. In sum, results indicated that this research model had an acceptable predictive relevance.

Constructs	R^2	Q^2
SCI	0.176	0.083
IP	0.510	0.293
FP	0.513	0.351

The model explains 51.3% of the variance in the level of firm performance by ITI, IP and SCI. In addition, 51% of the variance in the level of IP and 17.6% of the variance in the level of SCI

Goodness-of-fit index

Some of previous researchers proposed a PLS Goodness-of-Fit index (GoF) as “an operational solution to this problem as it may be meant as an index for validating the PLS model globally”. But Henseler and Fassott (2010) in recent times challenged usefulness of the GoF both conceptually and empirically. They indicated that the GoF does not represent a goodness-of-fit criterion for PLS-SEM. With regards the GoF is in compare of fit measures in CB-SEM, cannot divide valid models from invalid ones. Since the “GoF is also not applicable to formative measurement models and does not penalize over parameterization efforts, researchers are advised not to use this measure”.

Hypotheses testing

In this section the researcher proceeded with the path analysis to test the ten hypotheses generated. Relation between IT infrastructure and firm performance is not significant ($\beta = -0.020$, $t\text{-value} = 0.366$, $n = 274$, $p < 0.01$). For example, Dess et al. (2003) surprisingly believed that IT does not matter. The outcome of this investigation revealed that IT infrastructure does not directly affect the company routines. IT infrastructure as a valuable resource can improve firm performance; the resources may not be able to enhance firm performance by themselves (Rai et al., 2006). The more recent understanding is that the effect of the valuable resource may go through some other factors. A positive significant relationship between IT infrastructure and IP was found ($\beta = 0.297$, $t\text{-value} = 5.310$, $n = 274$, $p < 0.01$). The findings support previous studies by Lee et al. (2007) that showed contradictory results regarding the impact of the IT artifact on firm performance (Lee et al., 2007). A positive significant relationship between IT infrastructure and SCI was found ($\beta = 0.419$, $t\text{-value} = 6.887$, $n = 274$, $p < 0.01$). The findings supported the literature by Rai et al. (2006) that IT has a crucial enabler of SCI both outside and within the boundaries of an organization. A positive significant relationship between SCI and firm performance was resulted ($\beta = 0.360$, $t\text{-value} = 5.942$, $n = 274$, $p < 0.01$). The findings support the literature that there is empirical evidence showing a positive relationship between SCI and firm performance (Yang et al., 2009; Rai et al., 2006). There is a positive significant relationship between SCI and IP ($\beta = 0.537$, $t\text{-value} = 11.277$, $n = 274$, $p < 0.01$). The findings support the literature by Chandler et al. (2000) and Pitt (2009) that investigate empirically the relationship between internal integration, integration with suppliers and integration with customers that have been a positive effect on IP. There is a positive significant relationship between IP and firm performance ($\beta = 0.436$, $t\text{-value} = 7.181$, $n = 274$, $p < 0.01$). The findings support the literature by researcher such as Felicio et al. (2012) that IP has a positive influence on firm performance and result supported the hypothesis.

Mediating Effects

In current research, analyses of PLS-SEM mediator will follow specific suggestions of PLS-SEM provided. According to Figure 5 the PLS-SEM analysis findings can be observed. Therefore, it reveals that outcomes generating from assessing the relationships between organizational performance and IT does not include the two mediators known as IP and SCI. In case of measuring structural model with no mediator (Model 1), direct impact of IT on organizational performance is significant ($\beta = 0.389$, $p < 0.01$).

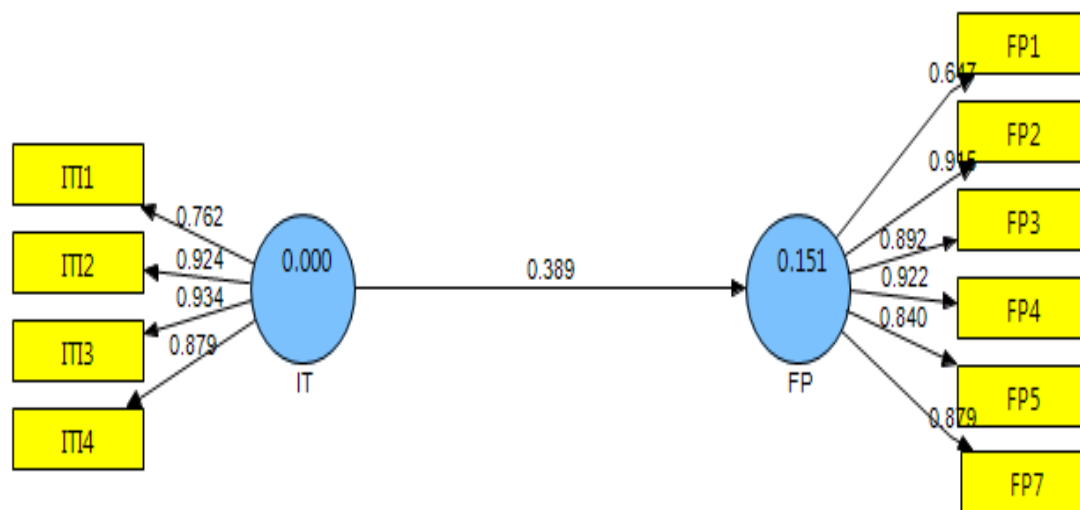


FIGURE 5
STRUCTURAL MODEL WITHOUT MEDIATORS (MODEL 1)

In this study, the analytical approach applied to test mediation hypotheses. After including the mediator construct SCI (Figure 6; Model 2), the result shows that IT has a high and significant effect on SCI, which in turn has a strong and significant relationship with firm performance. Furthermore, the SCI has a significant effect on firm performance ($\beta=0.588$, $p<0.01$). The indirect effects of IT *via* the mediator construct SCI is significant ($\beta=0.379$, $t\text{-value}=9.85$). Thus, the mediation effect is statistically significant. The findings support the literature by researchers such as Rai et al. (2006) that SCI has a mediating role between IT infrastructure and firm performance and the result supported the hypothesis. After including the mediator construct IP (Figure 7; Model 3), the bootstrapping analysis showed that the indirect effects of IT *via* the mediator construct IP is significant ($\beta=0.343$ with a $t\text{-value}=8.89$, $p<0.01$). In addition, the result shows that IT infrastructure has a high and significant effect on IP ($\beta=0.522$, $p<0.01$), however, has not a strong and significant relationship with firm performance.

Furthermore, the IP has a significant effect on firm performance ($\beta=0.588$, $p<0.01$). Thus, the mediation effect is statistically significant. The findings support the literature by researchers such as Rai et al. (2006) that IP has a mediating role between IT infrastructure and firm performance and the result supported the hypothesis. After including the mediator construct SCI, the bootstrapping analysis showed that the indirect effect of IT infrastructure on IP was significant ($\beta=0.22$, with a $t\text{-value}$ of 5.58, $p<0.01$). In addition, the result shows that IT has a high and significant effect on SCI ($\beta=0.419$, $p<0.01$) which in turn a strong and significant relationship with IP ($\beta=0.297$, $p<0.01$). The findings support the literature by researchers such as Rai et al. (2006) that SCI has a mediating role between IT infrastructure and IP and the result supported the hypothesis.

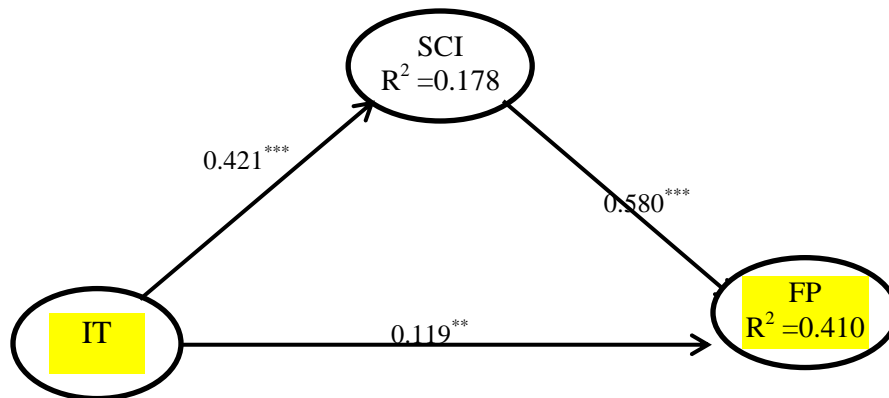


FIGURE 6
STRUCTURAL MODEL WITH SEPARATE ANALYSIS OF MEDIATOR SCI
(MODEL 2)

The bootstrapping analysis showed that the indirect effect of SCI on FP was significant ($\beta=0.239$, $p<0.01$) and SCI has high and significant effect on IP ($\beta=0.530$, $p<0.01$) which in turn a strong and significant relationship with FP ($\beta=0.360$, $p<0.01$). In addition, IP has significant effect on FP ($\beta=0.436$, $p<0.01$). Thus, the mediation effect is statistically significant. The findings support the literature by researchers such as Rai et al. (2006) that IP has a mediating role between SCI and firm performance and the result supported the hypothesis.

Figure 7 shows the final model of this study. As shown in the model, the effect of IT infrastructure on firm performance was not significant and the other hypotheses were significant.

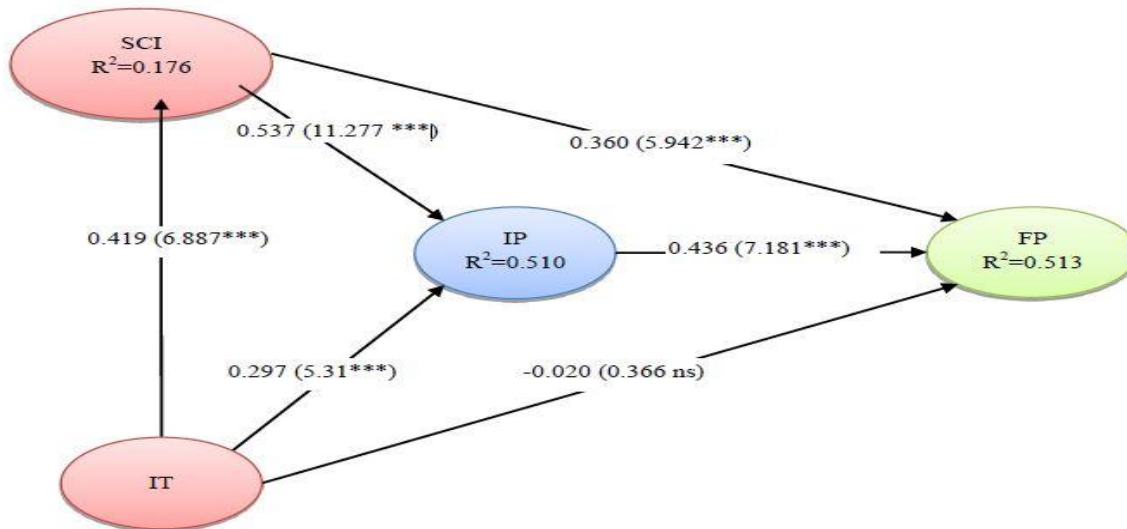


FIGURE 7
STRUCTURAL MODEL WITH SEPARATE ANALYSIS OF MEDIATOR SCI
(MODEL 3)

The results of the study revealed that the relationship of IT Infrastructure were significant with SCI and intrapreneurship. In addition, the relationships of SCI were significant with firm performance and intrapreneurship. The findings also indicated that IT infrastructure, SCI and intrapreneurship describe 53.3% of the variance in firm performance.

CONCLUSIONS

Contribution of the Study

Using RBV of firm, this study attempted to present a new and comprehensive model to implement SCI and intrapreneurship. Moreover, the study is in line with RBV of firm as an underlying theory of the study, which emphasizes effective implementation of resources by integrating organizational resources as a successful strategy to enhance organizational performance. Furthermore, this study in consist with RBV theory of firm sheds new light to role of the creative and innovative intrapreneurship in the supply chain and firm performance. Therefore, the results of the study have great potential to provide a basis for future theoretical and imperial studies on SCM context. The expected contributions of this research are reflected in two main fields: theoretical contribution and practical/managerial contribution.

Theoretical and Managerial Implications

The study contributes theoretically to academic research in several ways. First, this research provides supportive evidence, contributes to the RBV literature by extending the concept of supply chain with innovation in intrapreneurship context, and demonstrates how these two concepts (supply chain and intrapreneurship) resources are employed to create a competitive advantage. The second theoretical contribution presents a new approach to SCM and effective implementation of the system. Based on the reviewed literature, despite the unique characteristics of two different concepts, research on creating firm capabilities from benefits of the asset has not yet been firmly established or well structured. The study is along the lines of the RBV of the firm by synthesizing two concepts, integration and intrapreneurship, in SCM and presents a comprehensive and effective way to implement the system. The third theoretical contribution presents more justification about the dimension of intrapreneurship. This research contributes to theory building by addressing the uncertainty around the dimensions and definition of corporate intrapreneurship. In addition, this study contributes to the SCM body of knowledge by exhibiting additional evidence of the different effects of SCI and intrapreneurship concurrently on firm performance. The results confirmed that SCI can significantly improve business performance and that intrapreneurship can only slightly improve performance of SMEs in Pistachio industry. The fourth theoretical contribution presents a new an effective way to utilize resources in the supply chain. In addition, the study highlighted the imperativeness of social capital collaboration and relationships and indicated that collaborating with upstream and downstream partners could improve organizational performance.

Practical Contribution and Managerial Implications

Findings from this study give guidelines for executives to coordinate their management activities towards achieving better firm performance through supply chain integration, IT infrastructure and intrapreneurship. Based on the findings of this study, lack of knowledge on resources such as IT infrastructure in developing countries such as Iran is known as a barrier in SMEs as is lack of attention to after-sales service. These remedial actions are important and known as pre-requisites to facilitate using supply chain in Pistachio industry and SMEs. Therefore, managers should utilize IT infrastructure to improve their supply chain systems and to improve their connections with partners. Since some suppliers do not have a complicated system within their organization, adopting integration in technologies to support their supply chain system involves extra costs. Therefore, by applying SCI based on the findings in this study to support the utilization of IT infrastructure and plays a key role in the integration and growth of intrapreneurship in organizations, finally leading to improvement in firm performance.

This study also has implications for policymakers. The result of this study can help policymakers to encourage managers of SMEs to adopt some integrating systems such as IT infrastructure in the supply chain. Managers should not be skeptical about advantages of tangible resources such as IT infrastructure to get a competitive advantage. The resources will improve integration in supply chain and the organizations will be intrapreneurship in the market and able to be creative and innovativeness to the market, thus improving firm performance.

Conclusion

In this research, an attempt was made to find the relationships between IT infrastructure, SCI, intrapreneurship and organizational performance. Ten research hypotheses were formulated in this research. Regarding the answer to the first, which illustrates the effect of IT infrastructure on firm performance, the findings did not confirm any direct and significant relationship between IT infrastructure and firm performance. This study also outlined the relationship between IT infrastructure and intrapreneurship. The results disclosed that IT infrastructure could cause the supply chain to become more efficient. Finally, the second research hypotheses sought clarify the relationship between IT infrastructure and SCI. The results demonstrated that IT infrastructure is positively and significantly related to SCI. The second hypothesis was that regarding to relationship between SCI and firm performance. The findings validated that there is a positive and significant relationship between the two constructs. The result from this question also illustrated that the effect of SCI on intrapreneurship is positive. The third hypothesis underlines the relationship between intrapreneurship and firm performance. The results provide quantitative evidence that intrapreneurship is positively and significantly related to firm performance. Intrapreneurship can improve firm performance but its effect will be greater if the organization integrates with partners first, as this leads to an increase in Intrapreneurship. Finally, the last not the least hypotheses were on the mediating role of SCI between IT infrastructure, intrapreneurship and firm performance. The result highlight that SCI has a mediating role between IT infrastructure and firm performance. This study also investigated the mediating role of intrapreneurship between IT infrastructure and firm performance and the result shows that intrapreneurship has a mediating role between IT infrastructure and firm performance and shows

that IT infrastructure has a positive effect on firm performance through intrapreneurship. The results disclosed that IT infrastructure could cause the supply chain to become more efficient. In addition, it provides more clarification on the relationship between IT infrastructure, SCI and intrapreneurship. The results demonstrated that IT infrastructure is positively and significantly related to SCI and intrapreneurship.

Limitations and future recommendations

There are some unavoidable limitations of current study, first, this study is only based on the Iranian respondents and other nationalities are not included in this study. Second, this research is limited only to the Pistachio industry of Iran so the results of this study could not be the representative of all industries in this country. Third, this research emphasized on SMEs of Iran that might limit the applicability of results to other organizations. Therefore, these outcomes cannot generalize to larger firms and organizations. Fourth, this research only concentrated on certain stakeholders at intra-firm and interfirm levels. However, SCM includes a variety of activities both externally and internally. Fifth limitation was related to data collection method. This study used quantitative method for data gathering and bias can appear when respondents express their opinion by questionnaire. Future study should focus on how inter and intra collaborations both influence supply chain performance. In addition, some other factors can affect this performance. Hence, future investigations should contain other identified factors in previous studies in order to expand the model of the study. Other dimensions of intrapreneurship definitional also should be examined in future studies and suggest guidelines for more theoretical examination of this concept on related inconsistencies with this construct. Using only one industrial field can limit generalizability of study to other sectors. Besides this, data is limited to Pistachio industry of Iran, so it is not possible to generalize these findings in Iranian context to the other countries and industries. Conducting this analysis in other contexts shows future opportunities of study that could be done in some of the following directions: further examining with bigger sample sizes in the same industry is necessary and the inclusion of other industries they may establish conclusions which are also generalizable for other industries and firms. Additionally, more empirical investigations including data collection in different countries specifically developing countries are required.

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