Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231– 6345 (Online)
An Open Access, Online International Journal Available at www.cibtech.org/sp.ed/jls/2014/04/jls.htm
2014 Vol. 4 (S4), pp. 1079-1089/Harsini and Hassani
Research Article

THE STUDY OF EFFECT AND APPLICATION OF INFORMATION TECHNOLOGY IN SUPPLY CHAIN MANAGEMENT IN COMPETITIVE SITUATIONS (A CASE STUDY: COMPARING OF TURKISH AND IRAN AIR AIRLINES IN KERMANSHAH CITY IN 2013)

Mehdi Afzali Harsini and *Seyed Reza Hassani
Department of Business Management, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran
**Author for Correspondence*

ABSTRACT
The aim of this study is designing a conceptual model for the study of the impact and the application of information technology in supply chain management in competitive conditions. This model includes the independent variables of relationship with customer and electronic commerce and the dependent variables of internal integrity, managerial skills and the support of partner and their impact on performance progress in competitive conditions. The present study is applied in terms of aim, and descriptive-survey in terms of data collection type. The population of this study includes all employees of Iran Air and Turkish Airlines in Kermanshah city which are 105 individual and a sample of 83 individuals was selected using Cochran Formula and after the distribution of questionnaire, 79 questionnaires were correctly returned. A questionnaire with five-point Likert scale has been used for testing the hypothesis of the study and its content validity was verified by experts and professors and its reliability was obtained as equal to 94% using Cronbach's Alpha. The present study includes nine hypotheses that have been analyzed using SPSS and AMOS software after data collection. And combinational path analysis model of the two Airline companies indicates a positive and significant relationship between management of electronic communication with customer and support of partner, electronic commerce with internal integrity, managerial skills and support of partner with progress of performance and also support of partner and progress of performance and the lack of positive and significant relationship between management of communication with electronic customer and internal integrity and managerial skills and internal integrity with performance progress.

Keywords: *Information Technology, Supply Chain Management, Performance Improvement, Competitive Situation, Turkish and Iran Air Airlines*

INTRODUCTION
Choosing information technology in a supply chain has increasingly become a necessity for improving the performance of supply chain (Lai *et al.,* 2000).Supply chain management emphasizes effective and useful processes of physical and information factors are both effective in profitable fulfillment of customer needs (Stevens, 1989).
Supply chain management that, in its new form, includes some parts of electronic commerce and one of the new branches of management and is increasingly progressing and is in search for ways of improving the cycle of producing favorable products and services.
Supply chain management employs the newest progresses of management and technology. The result of this is advent of virtual organizations, significant reduction of prices, increase of efficiency, significant increase of profit, progress of general performance of the organization and improvement of providing services to customers (Akhshabi, 2011).
At work place, IT plays an important role in the performance of institution; IT gives information flow which makes the supply chain stronger and more flexible without reducing it efficiency (Bayraktar *et al.,* 2009) because IT integrity results in supply chain integrity and flexibility (Eric *et al.,* 2010). Nowadays, supply chain is on the top of organization activities and as IT is an important element in SCM, studying its impact on today's organizations is very important (Shaweek, 2003).

Statement of the Problem

Today, many organizations in the world are going towards getting bigger and increasing their business environment. One of the reasons for this is responding to the multiple needs of customers. Managers try to make customers more loyal to their organizations through meeting their multiple needs (Baldwin *et al.,* 2000).

Porter views information technology as the main factor in improving competitive advantage of firms and believes that development and changes of technology do not have value by themselves and the value of changes results from the fact that these changes is effective in competitive advantage of companies. According to Skinner, the major changes in management are due to progress of information technology. New technology creates new threats and opportunities and change in technology results in change in the way of business of firms and transforms organizational and social systems and results in efficiency and economic development and adds to living standards and increases competitive advantage.

IT gives the opportunity to the organization to extend its penetration domains in the world through reducing the costs and gives the opportunity to the organization to implement distinctive and applied plan and tactic for each customer (Kamrani, 2007).

1. The Aims of the Study

1.1 The General Aim

Studying the impact and application of information technology in supply chain management in competitive conditions

1.2 Special Aims

1. Identifying the structures impacting the application of information technology in supply chain management in competitive conditions
2. Measuring the structures impacting the application of information technology in supply chain management in competitive conditions
3. Ranking the structures impacting the application of information technology in supply chain management in competitive conditions
4. Designing the optimal model for effectiveness of the application of information technology in supply chain management in competitive conditions

4. The Hypotheses of the Study

4.1 The Main Hypothesis

There is a positive and significant relationship between dimensions of information technology and digitally enabled supply chain management

4.2 Secondary Hypotheses

1. There is a positive and significant relationship between management of communication with electronic customer and internal integrity.
2. There is a positive and significant relationship between management of communication with electronic customer and managerial skills
3. There is a positive and significant relationship between management of communication with electronic customer and partner support.
4. There is a positive and significant relationship between electronic commerce and internal integrity.
5. There is a positive and significant relationship between electronic commerce and internal integrity and managerial skills.
6. There is a positive and significant relationship between electronic commerce and partner support.
7. There is a positive and significant relationship between internal integrity and performance progress.
8. There is a positive and significant relationship between managerial skills and performance progress.
9. There is a positive and significant relationship between partner support and performance progress.

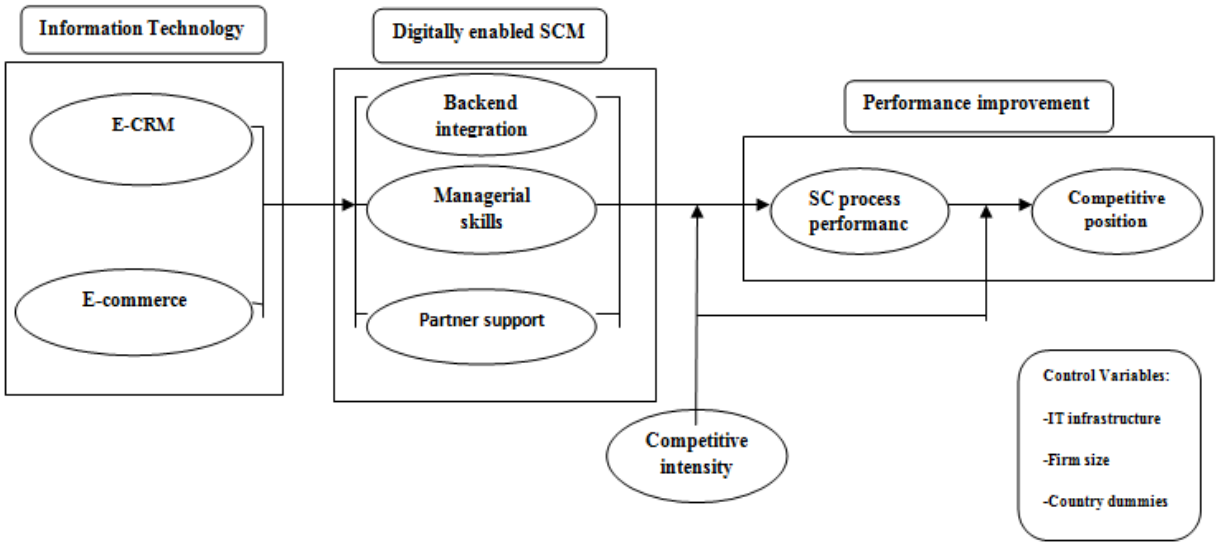
5. The Background of the Study

Number	Title	Author/year
1	The impact of information technology on supply chain and performance of commercial firms	Davidson and Beard (2003)
2	The importance of information technology in the ability of supply chain and organization performance	Vu *et al.*, (2006)
3	The role of information technology in gaining competitive advantage in the form of casual model of competitive advantage	Bakos and Tracy (1986)
4	The impact of integrating supply chain and sharing information: improving the performance of supply chain	Apek *et al.*, (2011)
5	Information technology in supply chain management: a case study	Ming *et al.*, (2011)
6	Information technology, managerial and practical competencies for precipitating of supply chain: findings of a case study	Eric (2011)

6. Operational Definition of the Variables

1	Developing a continuous relationship with customers is important.
2	More efforts should be devoted to paying attention to the existing customers not new ones
3	The marketing plans that are consistent with cultural and social conditions are used
4	It is responded to the needs of customers to future goods and services
5	e-commerce is compatible with our technological infrastructures well
6	Our organization has a positive attitude to e-commerce
7	We are working in a very competitive industry that needs the use of e-commerce
8	In the industry that we are working, we are competing with new commodities and services and we need to employ e-commerce
9	The organization provides information that helps the employees in understanding the general principles and values.
10	The employees feel comfortable in reporting the observed mistakes to their supervisor
11	Chief Executive Officer is completely committed to improve organizational leadership standards
12	The Chief Executive Officer and other managers of the organization respond in an appropriate way in the case of knowing about inappropriate guidance and leadership
13	When I provide consultation to others, I help them in finding a solution
14	I try to focus my attention on the work and the duty the individual does, not on the personality of the individual
15	My attention is close and is focused on a specific point instead of being general and vague
16	I try to dominate others in my conversations with them
17	Our partner is valuable and reliable
18	Partnership creates competitive advantage for both of us
19	The partner supports the importance that we give to providing services to customers
20	The partner helps us in reducing human resource costs
21	Using information technology in supply chain turns the organization objectives into individual, team and group objectives and guidelines
22	Using information technology in supply chain helps in clarification of organizational objectives
23	Using information technology in supply chain is a continuous and developmental process in which performance is improved over time
24	Using information technology in supply chain explains customers' perception of what should be improved and how this improvement should be created

Expressing the investigated variables in a conceptual model



7. The Methodology

In terms of the type of data collection, the present study is of descriptive-survey type. During the steps of its implementation, the present study is after describing the relationship between the recognized factors of information technology in supply chain management in competitive conditions. And for the implementation of the present study, first the theoretical framework of the study is explained and the existing conditions are described and the necessary data are collected by planning and distributing questionnaire. Then the data are analyzed using SPSS and AMOS statistical software and using structural equations modeling method.

7.1 The Population, Sample Size and Sampling Method

The population in this study is consisted of the employees of Iran Air and Turkish Airlines in Kermanshah city that are 105 individuals that directly impact the supply chain process.

The sampling method employed in this study is simple random sampling. In other words, the basis of inferential statistics is observed and Cochran formula is used for determining the sample.

$$n=\frac{(1.96)^2\left(\frac{0.2\times 0.8}{0.05^2}\right)}{1+\frac{1}{105}\left(\frac{(1.96)^2 0.2\times 0.8}{0.05^2}-1\right)}=82.6302\approx 83$$

Thus, here a sample of 83 individual is selected. After distributing questionnaire,79 of them were returned correctly and this number is the basis for our statistical work.

7.2 the methods and tools of data collection

7.2.1 methods:

a. library method: for literature review and background of the study
b. field method: for data collection

7.2.2 tools:

a. past documents
b. scientific texts and sources
c. internet
d. questionnaire

7.3 Validity and Reliability of the Questionnaire

for measuring the validity, in addition to the questionnaire being standard, the opinions of professors and skilled experts regarding the concepts, aspects and the components of data collection was used and by

doing the proposed corrections, it was determined that the considered indicators have been selected correctly and thus, this study has content-validity. A study is reliable if we give the measuring tools in a short time distance to a unique group and the results are close. In the present study, the reliability of the questionnaire is measured by Cronbach's Alpha. The more the number is close to 1, the more reliability it has. In this study the Cronbach's Alpha is equal to 0.94. Now, for each variable, Cronbach's Alpha has been calculated separately for each variable.

Table 2: The results of Cronbach's Alpha

Component	Cronbach's Alpha
Management communication with electronic customer	0/83
e-commerce	0/84
Internal integrity of the organization	0/81
Managerial skills	0/82
Partner support	0/74
Performance of supply chain process	0/75
Total	0/94

7.4 Data Analysis Method and Tools

Using descriptive statistics, we investigate the population and then test the hypotheses and draw path analysis diagram. For investigating the relationship between the independent and dependent variables and investigating the hypotheses of the study, Pearson correlation test it used using SPSS software. Also, for texting the set of casual relationship between the investigated components, the structural equations of the relationships among the variables are modeled using AMOS software.

Path analysis model for Iran Air Company:

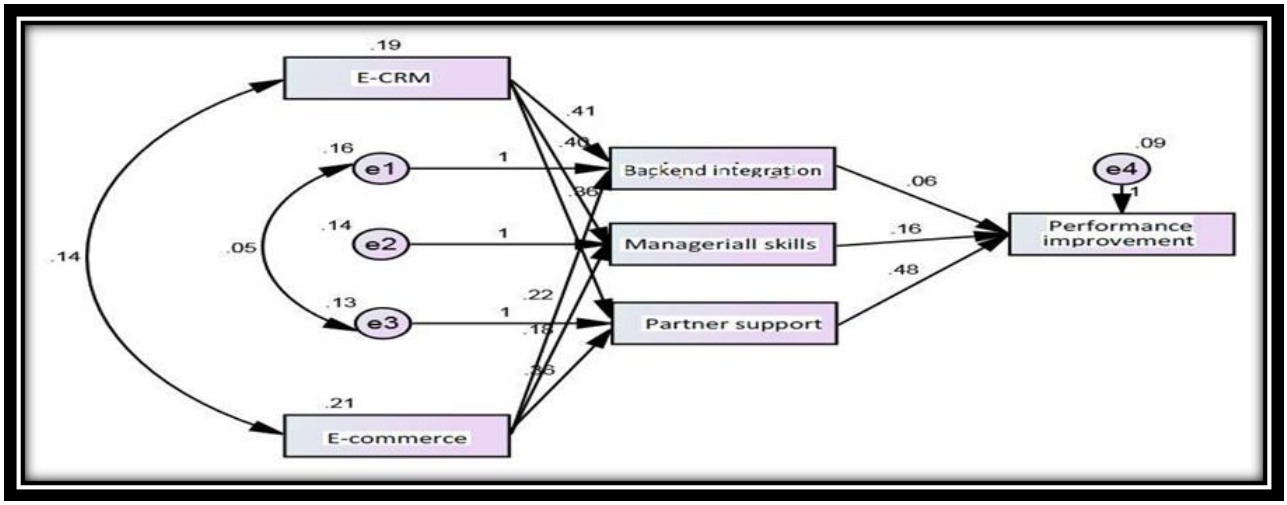


Figure 2: Path analysis of Iran Air model

In the above diagram, the explained variance for the variable of the management of communication with customer is 0.19 and the explained variance for the variable of e-commerce is 0.21. 0.40 is the regression coefficient of the variable of communication with customer on integration, 0.40 is the regression coefficient of the variable of communication with customer on managerial skills, 0.36 is the regression coefficient of the variable of communication with customer on partner support, 0.35 is the regression coefficient of e-commerce on partner support, 0.47 is the regression coefficient of partner support on the progress of performance in supply chain. Other variables that have not been mentioned, the impact

coefficients of them were not verified. 0.09 is the structural error of the dependent variable of progress of performance in supply chain.

For the model of the study the value of the Chi-square is 16.253, the degree of freedom is 4, and the level of significance is equal to 0.003. As the level of significance is lower than 0.05, we concluded that the fitted regression model among the independent and dependent variables is significant and appropriate.

Fit of the model: for model estimation the maximum likelihood method is used and for investigating fit of the model comparative fit index (CFI), normalized fit index(NFI), root mean square error of approximation (RMSEA)and standardized means square residual (RMR)were used.

Table 3: The indices of model fit of Iran Air

Fit index	Value	Standard values
CFI	0.900	Higher than 0.9 is acceptable
NFI	0.901	Higher than 0.9 is acceptable
RMSEA	0.098	Lower than 0.1 acceptable; lower than 0.05 very Favorable; between 0.05 and 0.08 is favorable
RMR	0.017	Lower than 0.05 is favorable

As it can be seen, CFI and NFI indices are equal to 0.900 and 0.901 respectively that are higher than the appropriate fit threshold. RESMA and RMR indices are equal to 0.98 and 0.17 respectively that are appropriate values for fit and the model is considered acceptable.

Path analysis model for Turkish Airlines Company:

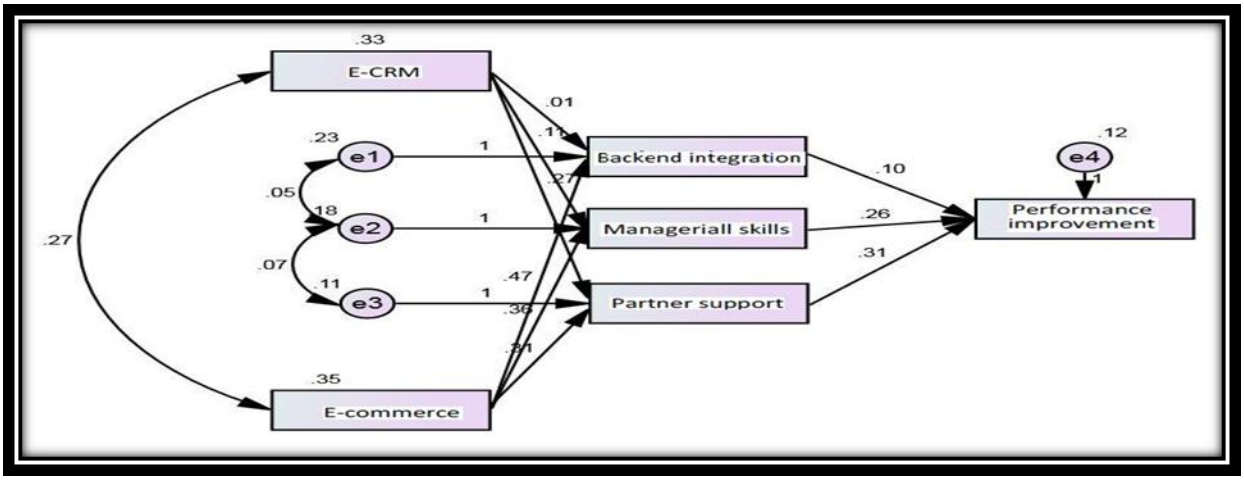


Figure 3: Path analysis of Turkish Airlines model

In figure (3), the explained variance for the variable of the management of communication with customer is 0.33 and they explained variance for the variable of e-commerce is 0.35. 0.46 is the regression coefficient of the variable of e-commerce on integration, 0.30 is the regression coefficient of the variable of e-commerce on partner support and for other variables that have not been mentioned, and the impact coefficients were not verified. 0.12 is the structural error of the dependent variable of progress of performance in supply chain.

For the model of the study the value of the Chi-square is 12.025, the degree of freedom is 3, and the level of significance is equal to 0.007. As the level of significance is lower than 0.05, we concluded that the fitted regression model among the independent and dependent variables is significant and appropriate.

Fit of the model: for model estimation the maximum likelihood method is used and for investigating fit of the model comparative fit index (CFI), normalized fit index(NFI), root mean square error of approximation (RMSEA)and standardized means square residual (RMR) were used.

Table 4: The indices of model fit of Turkish Airlines

Fit index	Value	Standard values
CFI	0.926	Higher than 0.9 is acceptable
NFI	0.912	Higher than 0.9 is acceptable
RMSEA	0.807	Lower than 0.1 acceptable; lower than 0.05 very Favorable; between 0.05 and 0.08 is favorable
RMR	0.025	Lower than 0.05 is favorable

As it can be seen, CFI and NFI indices are equal to 0.926 and 0.912 respectively that are higher than the appropriate fit. RESMA and RMR indices are equal to 0.87 and 0.25 respectively and as all the indices have gained appropriate value, it can be said that the Turkish Air model is acceptable too.
Combinational path analysis of the two airline companies

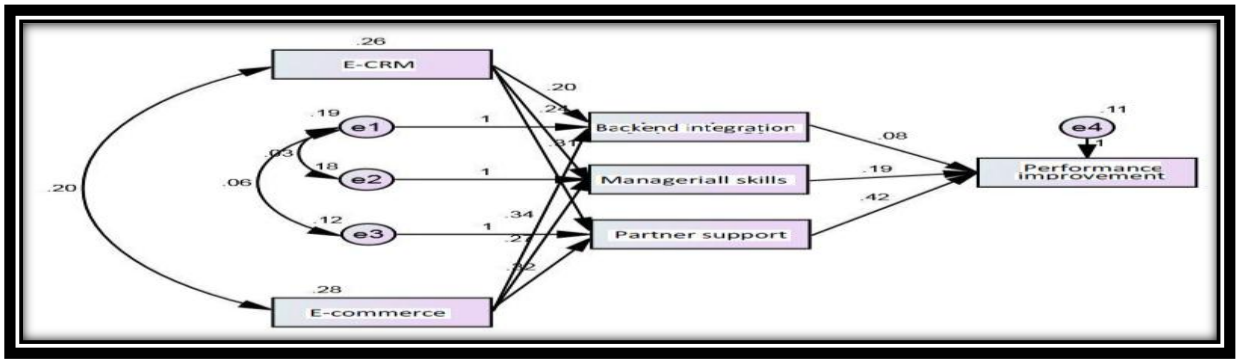


Figure 4: Combinational path analysis of the two airline companies

In figure (4), the explained variance for the variable of the management of communication with customer is 0.26 and the explained variance for the variable of e-commerce is 0.28. 0.30 is the regression coefficient of the variable of communication with customer on partner support, 0.33 is the regression coefficient of the variable of e-commerce on integration, 0.26 is the regression coefficient of the variable of e-commerce on managerial skill, 0.32 is the regression coefficient of e-commerce on partner support, 0.18 is the regression coefficient of managerial skills on the progress of performance in supply chain, 0.41 is the impact coefficient of partner support on performance progress in supply chain and other variables that have not been mentioned, the impact coefficients of them were not verified. 0.11 is the structural error of the dependent variable of progress of performance in supply chain.
For the model of the study the value of the Chi-square is 18.596, the degree of freedom is 3, and the level of significance is equal to 0.000. As the level of significance is lower than 0.05, we concluded that the fitted regression model among the independent and dependent variables is significant and appropriate.
Fit of the model: for model estimation the maximum likelihood method is used and for investigating fit of the model comparative fit index (CFI), normalized fit index(NFI), root mean square error of approximation (RMSEA)and standardized means square residual (RMR)were used.

Table 3: The fit indices of the combinational model

Fit index	Value	Standard values
CFI	0.929	Higher than 0.9 is acceptable
NFI	0.921	Higher than 0.9 is acceptable
RMSEA	0.076	Lower than 0.1 acceptable; lower than 0.05 very Favorable; between 0.05 and 0.08 is favorable
RMR	0.019	Lower than 0.05 is favorable

As it can be seen, CFI and NFI indices are equal to 0.929 and 0.921 respectively that are higher than the appropriate fit. RESMA and RMR indices are equal to 0.76 and 0.19 respectively and as all the indices have gained appropriate value, it can be said that the Turkish Air model is acceptable too.

Table 6: Investigation of the study hypotheses using Iran Air path analysis model

Hypothesis of the study	The level of impact	Level of significance	Result of the hypothesis
There is a positive and significant relationship between management of communication with electronic customer and internal integrity.	0/40	0/040	Verified
There is a positive and significant relationship between management of communication with electronic customer and managerial skills	0/40	0/030	Verified
There is a positive and significant relationship between management of communication with electronic customer and partner support.	0/36	0/042	Verified
There is a positive and significant relationship between electronic commerce and internal integrity.	0/22	0/239	Rejected
There is a positive and significant relationship between electronic commerce and internal integrity and managerial skills.	0/17	0/320	Rejected
There is a positive and significant relationship between electronic commerce and partner support.	0/35	0/035	Verified
There is a positive and significant relationship between internal integrity and performance progress.	0/06	0/60	Rejected
There is a positive and significant relationship between managerial skills and performance progress.	0/16	0/160	Rejected
There is a positive and significant relationship between partner support and performance progress.	0/47	0/000	Verified

Table 6: Investigation of the study hypotheses using Turkish Airline path analysis model

Hypothesis of the study	The level of impact	Level of significance	Result of the hypothesis
There is a positive and significant relationship between management of communication with electronic customer and internal integrity.	0/01	0/955	Rejected
There is a positive and significant relationship between management of communication with electronic customer and managerial skills	0/10	0/580	Rejected
There is a positive and significant relationship between management of communication with electronic customer and partner support.	0/27	0/076	Rejected
There is a positive and significant relationship between electronic commerce and internal integrity.	0/46	0/029	Verified
There is a positive and significant relationship between electronic commerce and internal integrity and managerial skills.	0/36	0/060	Rejected
There is a positive and significant relationship	0/30	0/040	Verified

between electronic commerce and partner support.			
There is a positive and significant relationship between internal integrity and performance progress.	0/09	0/382	Rejected
There is a positive and significant relationship between managerial skills and performance progress.	0/25	0/097	Rejected
There is a positive and significant relationship between partner support and performance progress.	0/31	0/054	Rejected

Table 6: Investigation of the study hypotheses using combinational path analysis model of the two companies

Hypothesis of the study	**The level of impact**	**Level of significance**	**Result of the hypothesis**
There is a positive and significant relationship between management of communication with electronic customer and internal integrity.	0/19	0/177	Rejected
There is a positive and significant relationship between management of communication with electronic customer and managerial skills	0/24	0/081	Rejected
There is a positive and significant relationship between management of communication with electronic customer and partner support.	0/30	0/008	Verified
There is a positive and significant relationship between electronic commerce and internal integrity.	0/33	0/016	Verified
There is a positive and significant relationship between electronic commerce and internal integrity and managerial skills.	0/28	0/048	Verified
There is a positive and significant relationship between electronic commerce and partner support.	0/32	0/004	Verified
There is a positive and significant relationship between internal integrity and performance progress.	0/08	0/370	Rejected
There is a positive and significant relationship between managerial skills and performance progress.	0/18	0/023	Verified
There is a positive and significant relationship between partner support and performance progress.	0/41	0/000	Verified

Discussion and Conclusion

Considering the results obtained from the first hypothesis, Iran Air Company is recommended to develop its technological infrastructures and put creating a continuous relationship with customers through website in long term in their agenda.

And it is necessary for Turkish Airlines Company to do more investigations in this regard and to strengthen its technological infrastructures for maintaining its position and to adopt the necessary preparations for implementing a system of management of communication with customer.

In this regard, it is necessary to identify and resolve the obstacles that prevent the creation of an electronic communication with customers. Considering the results obtained from the second hypothesis, Iran Air Company is recommended to hold class in high level and based on the needs and required skills in future. And in Turkish Airlines Company the managerial skills are one of the obstacles that prevents from the establishment of the system of electronic communication with customer.

Thus, it is necessary to identify these educational obstacles and weakness and the do appropriate actions for holding training classes for improving the skills based on the identified weakness so that to eliminate the obstacles.

Considering the results obtained from the third hypothesis, Iran Air Company is recommended to create necessary strategies and policies for increasing the competitive advantage that can be created by partner. And in Turkish Airlines company, for improving the partner support, the infrastructures that exist between partner support and the management of communication with electronic customer should be identified and emphasized in order to strengthen them; because many of the successes and development are created as the result of these communications and the support of partners and their results is improvement and consolidation of the competitive position and provision of better services to customers in a faster way.

Considering the results obtained from the fourth hypothesis, Iran Air Company is recommended to strengthen technological infrastructures for establishment of e-commerce system and to increase the flexibility of the organization by necessary and purposeful training of employees for acceptance of new technologies based on the competitive conditions. And it is necessary for Turkish Airlines Company to identify its strengths in this regard and to base the development based on all the infrastructures that exist for the impact of e-commerce on the internal integrity.

Considering the results obtained from the fifth hypothesis, Iran Air and Turkish Airlines companies are recommended to review their structure and to increase their flexibility for accepting e-commerce, due to the competitive condition in airline industry. Here, managerial skills are one of the obstacles that exist on the way of implementing and employing e-commerce and thus it is necessary to identify and resolve these obstacles with the aid of experts and consultants.

Considering the results obtained from the sixth hypothesis, Iran Air and Turkish Airlines companies are recommended to identify, emphasize and focus on the key and effective factors for strengthening and increasing e-commerce impact on partner support. And to identify and eliminate the factors that are obstacle between e-commerce and partner support so that they can create a stronger relationship between them and to create a distinctive competitive power for themselves at the end.

Considering the results obtained from the seventh hypothesis, Iran Air and Turkish Airlines companies are recommended to reinforce electronic infrastructures that result in the internal integrity of the company and to identify the effective factors between internal integrity and performance progress and also identify the obstacles that results in the failure of performance progress.

Regarding the eighths hypothesis, it is necessary to identify the factors that prevent performance progress. Also, correct recognition of the reasons for the lack of utilizing managerial skills seems necessary. And then it is necessary to correctly identify the effective factors that exist between managerial skills and performance progress and to plan based on them. Considering the results obtained from the seventh hypothesis, it is necessary to identify and resolve the reasons and problems that result in the lack of partner support. And to adopt necessary policies for gaining the partner support in long term that in turn results in creation of distinctive competitive ideas, innovations and characteristics.

REFERENCES

Akhshabi Mohammad (2012). Role of information technology in supply chain, employment and implementation. *Journal of Basic and Applied Scientific Research* **2**(2) 1124-1129.

Baldwing J (2000). Patterns of corporate diversification in Canada: an empirical, analysis, analytical studies research. Research paper series.

Bayraktar E, Demirbag M, Lenny Koh SC, Tatoglue E and Zam H (2009). Acausal analysis of the impact of information system and supply chain management practices on operational performance:evidence from manufacturing SME in turkey. *International Journal of Production Economics* (122) 133-149.

Bensaou M (1997). Interorganizational cooperation: the role of information technology an empirical comparison of us and Japanese supplier relation. *Information Systems Research* **8**(2) 107-124.

Bergquist (1993). *The Post-modern Organization, Mastering the art of Irreversible Change Sanfrancisco* (joosy-bass publishers).
Dong Shutao, Xinxu Sean and Zhu Kevin (2009). Information technology in supply chain:The value of IT-enabled resources under competition. *Information System Research* **20**(1) 18-32.
Doroodchi Mahmoud and Nik Mehr Navid (2007). A Study of the Importance and Application of Information Technology in Supply Chain Management. The Fourth National Conference on E-Commerce, Tehran.
Kamrani Maryam (2007). *The Principles of Information Technology* (Computer Sciences Publications).
King David and Torban Efrim (2006). *E-Commerce: Concepts and Applications,* Translated by Memar Nejad Abbas, first print (Nour Elm of Hamadan publications).
Lai Keehung (2000). Institutional isomorphism and the adoption of information technology for supply chain management.
Morgan Chris (2007). Supply network performance measurement: future challenges. *The International Journal of Logistics Management* **18**(2) 255-273.
Nilipour Tabatabi and Seyyed Akbar (2012). Optimization of the Application of Information Technology in Supply Chain Management and Marketing of Air Products by AHP Method. *New Marketing Studies Scientific Quarterly*.
Romano P (2003). Co-ordination and integration mechanisms to manage logistics processes across supply markets. *Purchasing and Supply Management* **9**.
Sarfarazi Mehrzad, Memarzade Gholamreza, Ghorbani Amir and Firoozi Zohre (20007). Paradigm of Electronic Management of Communication with Customer in Project.
Shawee K Vickery, Jayanth Jayaram, Cornelia Droge and Roger Calantone (2003). The effect of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships. *Journal of Operation Management* (21) 523-539.
Stevens GC (1989). Integrating the supply chain. *International Journal of Physical Distribution and Materials Management* 102-117.