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Research Article

IMPACT OF INFORMATION TECHNOLOGY ON SUPPLY CHAIN MANAGEMENT (CASE STUDY: BEHNOSH COLA FACTORY)

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ABSTRACT
Various improvements in the capabilities of the IT have changes industry face rapidly compared to the past decade. Adoption and implementation of information technology is one of the ways to distinct the competitive characters of companies and supply chain as well. IT adoption and implementation can improve an efficient correlation among supply chain members through accurate and fast data transmission, distribution and implementation of information systems and increase the efficiency of supply chain. In this regards, industries and companies are trying to use the tools, methods and technologies to make efficient processes with regard to modern and new technologies and to reduce the time and costs while enhancing performance, matching customers' ideas with standard and regulations and incorporate new technology. This study was performed to examine the impact of information technology on supply chain management (case study: Behnosh Cola factory). The results of this study suggest that there is a significant positive correlation between information technology and all aspects of supply chain management which is effective on all aspects. The results also show that organizational infrastructure, among all dimensions of supply chain management, is in the first place with an average rating of 10.46 and the research and development is in second importance.

Keywords: *Supply Chain, Supply Chain Management and Information Technology*

INTRODUCTION
In recent years, a new approach of supply chain management to manage problems successfully have created dramatic change in running costs decreasing and handling administrative issues in organizations. However, implementation of supply chain management can only be useful in organizations and achieve its objectives that interact with the objectives of the organization. One of the major issues of concern in organizations is IT that if it is understood in organizations, can appear as a powerful tool in the management of the supply chain. Studies have demonstrated the impact of information technology on improving accountability, distribute and transmit of data, chain efficiency and enhance cooperation between internal and external dimensions, prevent the emergence and development of the bullwhip effect in the sales channels. IT applications in supply chain management along with technology and information systems are very important. In addition, studies have shown that factors such as the size of the organization, the success rate, uncertainties and other chain partners' pressures can play a role in the acceptance of information technology. In today's competitive world that the organizations are competing and expanding products and services, IT is a known factor. IT functions and its role in the organization is known for managers of various organizations and these IT organizations are trying to achieve it. The use of supply chain management in IT can be a great help in improving the organization's goals. Therefore, in this study, it has been tried to analyze the identification of managers from supply chain in organizations. Following is the recognition and analysis of information inside organizations and its role and importance in organizations in order to use supply chain management and information. In recent years, a new approach that governs the operations management is supply chain management approach. Supply chain is a network of facilities and distribution centers that do tasks like procurement of raw materials, transforming it into finished products and interfaces and the distribution of finished products to

customers. Supply chain management performs coordinated activities in a way that customers can obtain products with high quality and lowest cost. In today's economy there is no other company to company competing, but the supply chains are competing. The supply chain includes all processes that directly and indirectly involved in the realization of customer needs and includes a range from end customers to the primary providers. Three streams of information, physical and monetary move in the main chain. Its main objective is to achieve maximum value for the customer's supply chain. So according to the above description, checking the information technology in the supply chain is essential, because they both seek to achieve a competitive advantage to deliver maximum value to end customers. Therefore, the aim of this study was to evaluate the effects and uses of information technology in supply chain management and important factors in admission of information technology. In addition to better understand this, we take a look at the importance and role of information in the supply chain and supply chain features with data flow approach.

Research Literature

Supply Chain Management

Supply chain management associates with unity on supply chain activities and information flows in chain through improved, reliable and continued relationships to gain continues competitive advantage (Ghazanfari *et al.*, 2001). The purpose of supply chain management is to exchange information on market requirements, develop new products, reduce the number of suppliers for manufacturers and to activate and release management resources to develop long-term important relationships that the initially is formed based on members trust (Berry, 1994).

Elements of Supply Chain Management

The most important issue of some members is that the importance and criticality of each member to achieve the production target determines the network of communication, participation and cooperation with the appropriate trade. Members of the supply chain organizations consist of the organizations and administrative units that increase the added value of the network in the field of business through operating process and management and are active in the design and delivery of the product to market and customer network outputs (Lambert, 1998). The first element is the customer, a motivating factor. Usually marketing is to determine what customers want and also predict the amount of time for customer demand. Designed product and service according to customer needs matches with operational capability. Processing on any part of the supply chain determines the central focus of the organization. Much of the organizational process is done to produce a product or service to the end user and scheduling is a major aspect of this section for the inner and outer segments of the supply chain (Feizabadi, 2003). The following table summarizes the key elements of supply chain management.

Table 1: Key elements of the supply chain (Feizabadi, 2003)

The common thread	Component
Determining the type of needed product or service	costumers
predicting the amount and timing of customer demand	Prediction
integrating the customer desires, making capabilities with tools	Designing
quality control, scheduling of work	Processing
Meeting the demanding requirements while managing costs of inventory	inventory
Evaluation of the potential suppliers, supporting the operational needs of the purchased goods and services	purchasing
monitoring supplier quality, on time delivery and flexibility	Suppliers
determine the location of facilities	Positioning
Decision making about transportation and sale of raw materials	Support

The supply chain must be designed to minimize inventory and achieve a high quality of the suppliers among customers. It is hard to unify and control the suppliers; also a number of suppliers can be risky because if they are not trustable, their competitive power will decrease. The suppliers should move

toward the costumers" satisfaction and operate with the same goals and quality expectations. For a company to achieve its strategic objectives, uncertainty should be controlled as a destruction factor of supply chain management.

This requires identifying and understanding the causes of uncertainty, determining how uncertainty affects the actions of others up and down the supply chain and setting regulation and procedures to reduce or eliminate it. Also, delivery time and cost are influenced by positioning and includes support, displacement and storage of materials. The success of supply chains depends on the efficiency and timeliness (Feizabadi, 2003).

IT in Supply Chain

Using the softwares in supply chain was started in the late 1990s, a growing number of enterprise softwares not only create new categories of software development and expansion of product lines than in the past, but the dynamics of the company has gone up. Jalali et al (2007) reviewed previous studies, and categorized the factors affecting the adoption of information technologies in the supply chain as follows:

1. Organization extent

Organizations with large extent of have more willing to embrace information technology due to funding resources. In this context, receive more risks associated with this task. Thus, there is a significant positive correlation between the extent (size) of organization and information technology adaptation.

2. The success of the organization

According to the successful practices in past, organizations tend to be stable against changes of strategy. So the possibility of change is very low for organizations with better performance in recent years.

3. The effect of shareholders in chain

One of the most important environmental factors for organizations that affects IT adaptation is the impact of shareholders inside the chain. Pressure from the partners in the supply chain can affect IT adoption.

4. Uncertainty

Uncertainty in supply chain management is the most important issues that the main factors in its creation are the lack of accurate and complete information for decision. So the probability of adoption and acceptance of information technology is greater in organizations with more uncertainty.

5. Senior management support

The role of senior management in the implementation and application of information technology in organizations is so important. Senior management support can have a positive impact on the adoption of information technology in organizations (Salehi, 2010).

Factors Influencing the Adoption of IT in Supply Chain

1. The extent of the organization

Studies have shown that organizations that have expanded due to financial resources are more willing to accept information and in this context they receive more risks associated with this task. Thus, there is a significant positive correlation between the extent or size of organization and information technology adaptation.

2. The success of organization

Previous studies have also shown that successful organizations tend to be stable against changes of strategy. So the possibility of change is very low for organizations with better performance in recent years. The organizations with poor performance, compared with those with better, try to build their strategy based on the acceptance of information technology. So, successful organizations have less incentive to adopt supply chain technologies.

3. The effect of shareholders in chain

One of the most important environmental factors for organizations that affects IT adaptation is the impact of shareholders inside the chain. Pressure from the partners in the supply chain can affect IT adoption. For example, when a company starts to implement EDI and step forward in the adoption of this technology, cause pressure on other companies and attracts their opinion in this case. Therefore, other companies have to accept new technology to be able to adapt data with standardized format and also to create the unity development inside the organization and inter-organizations in supply chain. Thus, organizations are

under more pressure in the supply chain by trading partners and move more towards the adoption of technologies related to supply chain.

4. Uncertainty

Uncertainty in supply chain management is the most important issues that the main factors in its creation are the lack of accurate and complete information for decision. Advanced information technologies within organizations or between members of the supply chain become integrated, providing the ability to share information faster and more accurately. So the probability of adoption and acceptance of information technology is greater in organizations with more uncertainty and reverse condition is in organizations with relatively stable operational and environmental situations.

5. Senior management support

The role of senior management in the implementation and application of information technology in organizations is so important. Senior management support can have a positive impact on the adoption of information technology in supply chain.

Research Questions

The Main Research Question

Is there a meaningful relationship between information technology and the improvement of major activities of Behnosh Cola factory?

Research Secondary Questions

1. Is there a meaningful relationship between information technology and the improvement of input service of Behnosh Cola factory?

2. Is there a meaningful relationship between information technology and the improvement of production process of Behnosh Cola factory?

3. Is there a meaningful relationship between information technology and the improvement of output service of Behnosh Cola factory?

4. Is there a meaningful relationship between information technology and the improvement of marketing of Behnosh Cola factory?

5. Is there a meaningful relationship between information technology and the improvement of after sales service of Behnosh Cola factory?

6. Is there a meaningful relationship between information technology and the improvement of infrastructures of Behnosh Cola factory?

7. Is there a meaningful relationship between information technology and the improvement of human resource management of Behnosh Cola factory?

8. Is there a meaningful relationship between information technology and the improvement of research and development of Behnosh Cola factory?

9. Is there a meaningful relationship between information technology and the improvement of procurement of Behnosh Cola factory?

MATERIALS AND METHODS

This study was applied in terms of objective. The nature and methods of study were descriptive correlation. The research population consisted of all (65) persons employed in Behnosh soft drink factory. Due to the limited number, there is no need for sampling and all the members have been used. The questionnaire was used to collect data. Reliability of research results are in the table below:

As seen from the table above, alpha coefficient of each factor in conceptual model is above 70 percent which is an acceptable and appropriate coefficient. Pearson correlation coefficient was used to test the hypotheses. Also Friedman test was used for ranking factors affecting the phenomenon controllers.

Table 2: Cronbach Alpha for first questionnaire (Supply Chain Management)

Cronbach Alpha	factor	
0.877	improvement of input service	**Dimensions of Empowerment**
0.670	improvement of production process	
0.709	improvement of output service	
0.777	improvement of marketing and sale	
0.853	improvement of after sales service	
0.789	improvement of organizational infrastructures	
0.869	improvement of human resource management	
0.938	improvement of research and development	
0.690	improvement of procurement of factory	
0.860	General Cronbach Alpha	

Data Analysis

First Main Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and main activities of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and main activities of Cola Factory.

Table 3: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.450	72	activities of Factory	IT

According to Table 3, Pearson correlation coefficient between IT and the main activities of the company is 0.450 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

First Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and input service of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and input service of Cola Factory.

Table 4: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.011	-0.193	172	input service	IT

According to Table 4, Pearson correlation coefficient between IT and the input service of the company is - 0.193 and the level of significance is 0.011. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables. Since the sign of the correlation coefficient is negative, it can be concluded that there is an inverse relationship between two variables. The reduction in one causes the increment in another case.

Second Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and production process of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and production process of Cola Factory.

Table 5: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.428	72	production process	IT

According to Table 5, Pearson correlation coefficient between IT and production process of the company is 0.428 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Third Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and output service of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and output service of Cola Factory.

Table 6: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.295	72	output service	IT

According to Table 6, Pearson correlation coefficient between IT and output service of the company is 0.295 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Forth Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and marketing and sale of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and marketing and sale of Cola Factory.

Table 7: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.604	72	marketing and sale	IT

According to Table 7, Pearson correlation coefficient between IT and marketing and sale of the company is 0.604 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Fifth Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and after sale service of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and after sale service of Cola Factory.

Table 8: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.332	72	after sale service	IT

According to Table 8, Pearson correlation coefficient between IT and after sale service of the company is 0.332 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Sixth Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and organizational infrastructures of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and organizational infrastructures of Cola Factory.

Table 9: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.501	72	organizational infrastructures	IT

According to Table 9, Pearson correlation coefficient between IT and organizational infrastructures of the company is 0.501 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Seventh Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and human resource management of Cola Factory.

Opposite hypothesis (H1): There is a significant positive relationship between the IT and human resource management of Cola Factory.

Table 10: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.451	72	human resource management	IT

According to Table 10, Pearson correlation coefficient between IT and human resource management of the company is 0.451 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Eighth Secondary Hypothesis

Table 11: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.539	72	R&D	IT

The null hypothesis (H0): There is no significant positive relationship between the IT and R&D of Cola Factory.
Opposite hypothesis (H1): There is a significant positive relationship between the IT and R&D of Cola Factory.
According to Table 6, Pearson correlation coefficient between IT and R&D of the company is 0.539 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Ninth Secondary Hypothesis

The null hypothesis (H0): There is no significant positive relationship between the IT and procurement of Cola Factory.
Opposite hypothesis (H1): There is a significant positive relationship between the IT and procurement of Cola Factory.

Table 12: Correlation test

Results	sig	Correlation coefficient	number	Second variable	First variable
There is a significant relationship	0.000	0.449	72	procurement	IT

According to Table 12, Pearson correlation coefficient between IT and procurement of the company is 0.594 and the level of significance is 0.000. Given that the significant level of correlation is less than 0.05, the null hypothesis is rejected, and we can claim with 95% confident that there is a significant correlation between these two variables.

Ranking the Main Activities of the Factory

Following is in order to identify the main activities of Behnosh soft drink (Cola) factory based on Friedman non-parametric test, rating of company's nine main activity indexes was performed in Table (13). This ranking reflects the fact that the organizational infrastructure has the highest average rank among the activities that are related to soft drink factory and then the research and development (R&D), human resource management and..... output service ranked respectively from the second to the ninth. So first we need to strengthen the institutional infrastructure and then enhance other aspects.

Table 13: Ranking of major activities in Cola factory using Friedman test

Rate of each dimension	Average rating	variables
1	10.46	Organizational infrastructures
2	9.02	R&D
3	8.84	Human resource management
4	8.37	Production process of factory
5	8.12	Marketing and sale
6	7.67	After sale services
7	7.29	procurement
8	6.79	Input service
9	6.43	Output service

RESULTS AND DISCUSSION

The Main Research Question

As can be seen in Table 4, there is a meaningful relationship between information technology and major activities of Behnosh Cola factory.
The main activities are those activities increase value terms that are called (VALUE-ADDED). It means doing them will boost the value of the product and move it up toward the customer. For example, the

incoming raw materials, receiving, storage, etc. (the logistic input). Then manufacturing operations are carried out on these materials which promote the product. Followings are product packaging, transport and storage (Logistics output). Then marketing will increase the value of the product and product sales converse the product to money. After sale service is another valuable activity which is applied on the final product. All of these activities are the direct source of profitability. So IT will affect the main activities of factory and makes the activities to be performed efficiently and dynamic in an organization.

1st Secondary Questions

As can be seen in Table 4, there is a meaningful relationship between information technology and input service of Behnosh Cola factory.

Expressions of the use of information technology in all areas of the industry value chain (VALUE CHAIN) are evident from the relationship from suppliers to produce and communication with customers. The first effect of information technology on management and systems is the billing. The purpose of the system is to reduce data processing costs.

Development of information systems shapes MRP systems in the planning the required materials. Followed by the development of this system was MRPII systems. In the 1990s, ERP systems emerged to solve the problem of lack of integrity of the system and exploit the advantage of integration. Moreover, with the development of network facilities, inter-organizational systems (IOS), electronic exchanges (EDI) and recently e-business (E-BUSINESS) were developed.

2nd Secondary Questions

As can be seen in Table 5, there is a meaningful relationship between information technology and production process of Behnosh Cola factory.

In the industrial world today, the production is seen as a competitive weapon. Manufacturing organizations located in an environment that can be characterized by increased competitive pressures, diversification of products, changes in social expectations and increased customer's expectations. While there should be a qualitative product, must remain only a short time in the market and must be replaced with other products that are compatible with the latest tastes, preferences and needs of customers. Neglect or failure in customer demands or timely deliver can be very expensive. This condition causes the information to be very important for manufacturing organizations.

3rd Secondary Questions

As can be seen in Table 6, there is a positive meaningful relationship between information technology and the improvement of output service of Behnosh Cola factory. As it was said above, IT is effective on all of the activities such as input service, operations, manufacturing, output service, marketing and sales and after-sales service. All of these activities are a source of profit for organization. Therefore, the IT in organization will organize all these activities to be done properly and led to the return value.

4th Secondary Questions

As it can be seen in Table 7, there is a positive meaningful relationship between information technology and marketing and sale of Behnosh Cola factory. It is expected that R&D make new opportunities for factory. It seems that internet porter will improve overall process in value chain among industries and firms through acceleration and simplifying information exchange process. Orbai and Min state that IT is changing organizations and processes, and create new opportunities and challenges for marketing. Also many global markets are quickly become integrated and borderless. King and Evans discussed how the Internet may improve the access to competitive intelligence, customer service, inventory planning, time, sales channel identification and reduce costs.

5th Secondary Questions

Table 8 shows that there is a meaningful relationship between information technology and after sales service of Behnosh Cola factory.

Competition in a world where the quality of products is every day closer to the quality of services, after sales service can be viewed as an integral of industrial products. Development of ICT infrastructure in the country will provide the area to better serve its customers in less time. So that today it is referred to as e-sales services.

6th Secondary Questions

Strategic Planning is the future planning of the organization, the direction that the organization wants to move in and strategic planning for the organization is a document that information architecture determines in light of strategic considerations, such as the mission, objectives and priorities of the organization and also plans to achieve the organization's systems and databases. In other words, IT strategic planning is a charter and macro-program of organization about information systems and generally information technology. Different approaches are used for planning. Currently enterprise architecture or IT architecture is the dominant approach for long-term planning or comprehensive planning for information technology.

7th Secondary Questions

ICT has changed our life and the ways we communicate. Basically, the Internet, more or less has changed all aspects of human society. In recent years, the importance of Internet and information technology - both in commercial space and private space - significantly increased (especially with the increase of Internet users and increased Internet service). Undoubtedly, employees and their work environment, job design, work conditions and many other things have been affected by the Internet and information technology. As Barley states "future success - most likely - depends on the use of scientific and technical knowledge, information management and providing better services. Future will depend on brain compared to the muscles (Barley, 1996).

8th Secondary Questions

Information technology will cause the productivity of people and information in organizations and social systems interpret information from various perspectives. Research and development (R & D) in the context of the transformation itself has become today as a major industrial and government activity and for organizations to respond to industrial, technological, political, security and cultural issues of nations of the world and a tool for economic development of the country. Growing rate of unemployment the digital gap has followed the gap of knowledge and awareness between countries in the world and the international community. Organizations by focusing on science and technology and creating balance and interaction between these factors can create a dynamic working and learning environment maintain the progress of competitive research and development.

9th Secondary Questions

As the table (12) shows, there is a positive significant relationship between information technology and procurement in cola factory.

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REFERENCES

Feizabadi J (2003). Introduction to Supply Chain. *Tadbir Journal* **131**(25) 49.

Ghazanfari M, Riazi A and Kazemi M (2001). Supply chain management. *Tadbir Journal* **117**(8) 25-36.

Gilaninia S, Mousavian S, Tayebi F, Panjtan P, Ashouri S, Touhidi R, Nobahar R, Azizi N and Zadbagher Seighalani F (2011). The Impact of Information Technology Application on Supply Chain Performance. *Interdisciplinary Journal of Contemporary Research in Business* **3**(8) 489-496.

Gunasekaran A and Ngai EWT (2004). Information systems in supply chain integration and management. *European Journal of Operational Research* **159**(2) 269-295.

Kolluru R and Meredith PH (2001). Security and trust management in supply chains. *Journal of Information Management & Computer Security* **9**(5) 233-23.

Lambert DM (2004). The High Essential Supply Chain Management Processes. *Supply Chain Management Review* **8**(6) 18-25.