

## **THE ROLE AND EFFECT OF INFORMATION TECHNOLOGY IN THE CREATION AND MAINTENANCE OF SUSTAINABLE COMPETITIVE ADVANTAGE**

**A. Talebnejad<sup>[1]</sup>**

Faculty of Management and Accounting

Shahid Beheshti University

Email: taleb149@yahoo.com

**Abstract** -By the appropriate use of information technology, organizations can achieve sustainable competitive advantages. This technology because of including some characteristics such as being up-to-date, fast and precise and having different geographic localities all the time, has improved organizational efficiency, effectiveness and performance.

In this article, we intend to investigate the role and effect of information technology in the creation and maintenance of sustainable competitive advantages from two different approaches: market-based approach and the resource-based approach. In the Market-based approach, meeting customer's and creating values for them, using information technology and the issue of achieving the competitive advantage and position in the market by organizations are addressed. In the resource-based approach, compatibility of the organization's resources such as those of information technology and organizational skills, particularly managerial ones are investigated. Amongst different organizational skills and resources, only managerial skills of information technology can create a sustainable competitive advantage.

**Keywords:** Information Technology, Sustainable Competitive Advantage, Creation of Value for Customers, Resource-Based Approach, Market-Based Approach.

### **INTRODUCTION**

At the present time, organizations can achieve sustainable competitive advantage using information technology in an appropriate way to answer business requirements. Organizations have to know how to apply this technology in their own organizational processes and activities. This awareness is vital to the organizational success. Evidences indicate that implementation of successful business strategies using information technology has led to the improvement of organizational efficiency and effectiveness [1]. In 2004, the relation between investment in information technology and the sales performance of 500 large companies in the United States was investigated. The study showed that there was a direct and positive relation between the amount of investment and the sales performance of these companies. In the other survey, the top managers of

a number of organizations in the United States were asked about the role of information technology in organizational success. More than %79 of these managers believed that information technology had a vital role in organizational success [7]. (Figure 1)

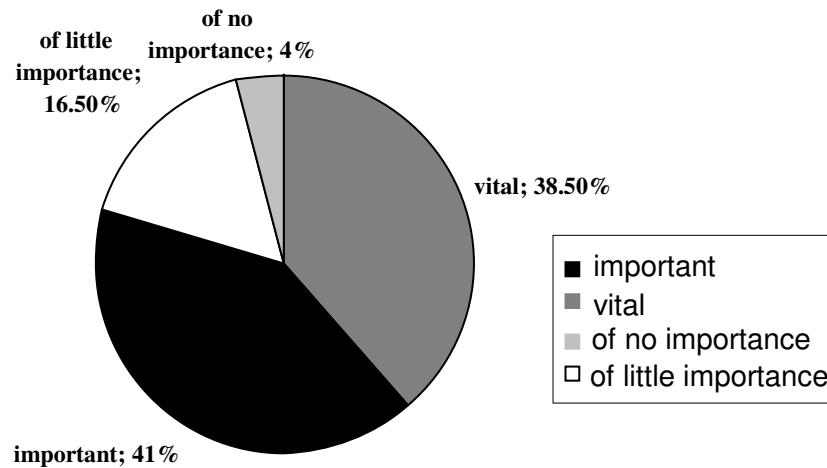


Figure 1: The role of information technology in organizational success according to the top managers of some companies in the U.S.A.

## - INFORMATION TECHNOLOGY

The Characteristics of the information era have led us to a new set of technologies called “Information Technology.” Information technology is a series of different implements including hardware, software, information theories, information networks, workstations and artificial intelligence (robotics) which use different forms of information as a systematic process to carry out activities [19]. This technology was paid more attention since the 1980s and its first organizational functions were in the automating official and productive jobs and performing routine tasks. Using intra-organizational networks and internet, information technology has improved intra-organizational communications through intranet and extranet communications.

This technology has led to the fast, precise and large-scaled publication of information in different geographical places all the time. Circulation of information with these characteristics has resulted in decreasing costs, saving in localities, expedition in doing activities and thus increasing profitability and efficiency and effectiveness of technology. Rapid development of information technology caused special attention to be focused on informational knowledge.

The most important criterion to measure the knowledge of individuals and organizations is a sort of informational knowledge enabling people to:

1. Appreciate the importance of information to the problem-solving process.
2. Recognize informational needs.

3. Appreciate the value of information.
4. Find the relation between different information.
5. Know how to add new information to series of old ones.
6. Recognize informational sources.
7. Know how to gather information.
8. Know how to use information in the process of problem-solving [12].

#### **- THE COMPETITIVE ADVANTAGE**

The competitive advantage is the focal point of strategy and a basic concept in strategic management. This advantage is developed by differentiating an organization in a special business compared with other competitors in the opinion of stakeholders, particularly customers. The customer must mentally feel that the organization in question is able to create more value for him than other competitors. If an organization does not possess competitive advantage, it can not survive in the long run. The more the difference between the organization and other competitors, the more sustainable and strong the competitive advantage will be. Competitive advantage is a result and sustainability is a situation created after the failure of imitative and patterning attempts of the factor causing the competitive advantage. What makes an organization a successful one in the long run is the possession of sustainable competitive advantage. Opportunism and short-sightedness will not create success in the long run. An organization can not purchase sustainable competitive advantage from the market, but it has to acquire it through creating superior ability in managerial activities. This is a competitive advantage to be created, conquered and maintained by organizations [13].

#### **- INFORMATION TECHNOLOGY AND COMPETITIVE ADVANTAGE**

Information technology can create competitive advantage for an organization and improve its competitive position in the market [2,6]. In order to create sustainable competitive advantage in an organization using information technology, we must first understand the influence of technology on organizational activities and processes and know how to create value using it [15].

IT has changed the structures and organizational processes. This technology has caused organizations to become small, decreased the number of staffs and organizational level, extended inside and outside organizational communication and also decreased communication costs. Suitable use of IT implies repeated creation of the structure and organizational processes. In a new creation, the main emphasize is on creating simple and direct relationships between the staff, customers, products and electronical definition of organizational processes [14].

In a survey, senior managers of some companies in the U.S.A were asked about their most important challenge in facing information technology. These managers said that the most important challenge which they face, was not inaccessibility to the advanced information technology but how to use this technology optimally and efficiently in their businesses [7].

We should use information technology in organizational activities and processes in a way that a synergy is created by their combination. The resulted synergy in the implementation of an appropriate combination of these technologies in the organization is something not to be easily imitated or copied. Many managers believe that advantage resulted from information technology in itself is short-lived and can easily be imitated and patterned by competitors [4]. Therefore, organizations must put more emphasis on information organizational and managerial skills and also informational systems in and out of the organization through this technology. The difference among organizations in profitability and optimum performance is more due to the difference in managerial skills rather than a difference at the level of information technology. Managers, who are able to organize and manage separate activities better than others by the use of information technology through an appropriate proportion and relation, will experience a higher level of profitability and a more optimum performance.

In all, in order to create sustainable competitive advantage through information technology we must know how:

1. This technology influences the business and performance of organization.
2. To define business opportunities on the basis of IT.
3. To assess technological innovations.
4. To design the new technology in the form of a business model.
5. To manage the changes relating to technology.
6. To implement the appropriate technology.

In this article, the role and influence of information technology in creating sustainable competitive advantage will be discussed from two different approaches:

1. Market-Based Approach: In this approach, it is believed that the survival of an organization depends on the market, customers' needs and creating value for them. An organization must optimally provide the customers with their needs in appropriate time and place and create sustainable competitive advantage for itself through calculated implementation of the information technology tools. This approach looks at the matters out of the organization.

2. Resource-Based Approach: In this approach, it is believed that an organization needs first to recognize its resources, abilities and skills and then, identify sort of the customers' needs which could be provided efficiently using these resources and skills.

One of the most important organizational resources and skills is information technology which can be a source of sustainable competitive advantage. This approach tends to direct towards the inner part of the organization.

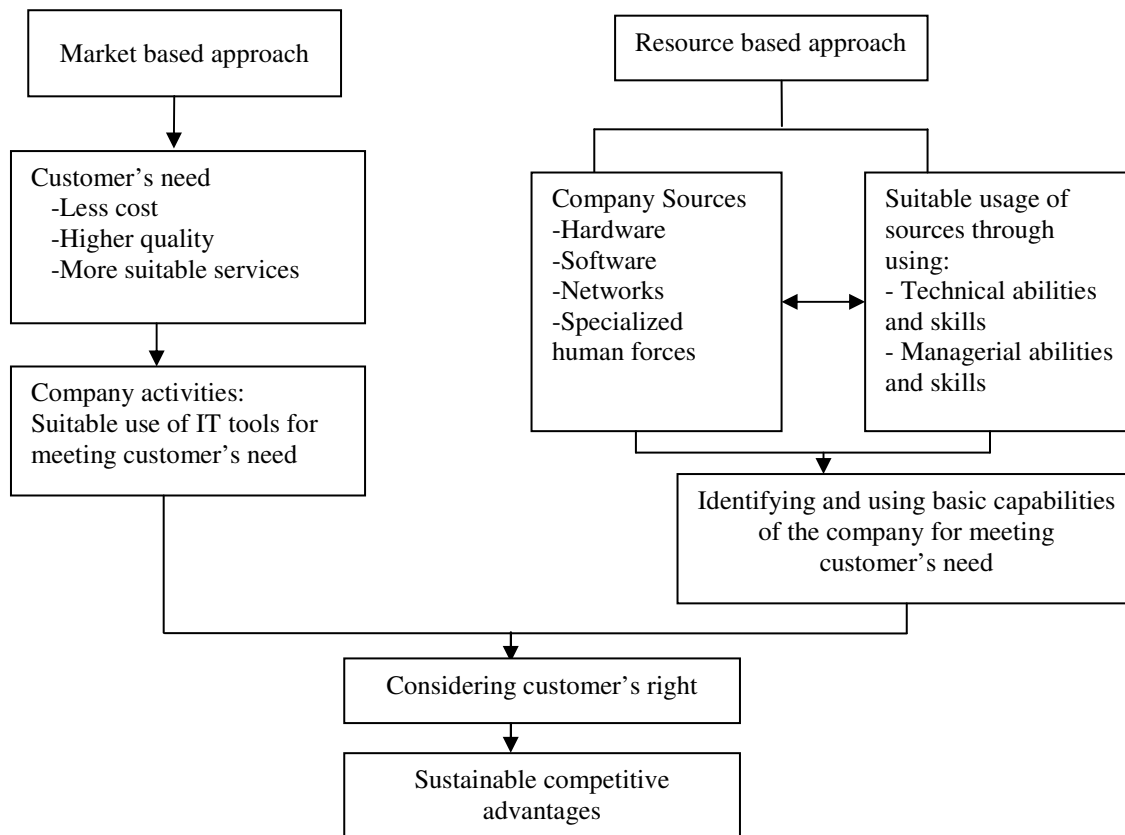


Figure 2: IT role in creating consistent competitive advantages through market and source based approach.

## INFORMATION TECHNOLOGY AND THE MARKET-BASED APPROACH

An organization is defined as possessing competitive advantage that can create a value more than that of competitors for its own stakeholders. One of the tools used to create value for stakeholders is the implementation of information technology in organizational business. It must be kept in mind that without considering the creation of value for customers, mere usage of information technology in organizational activities and processes is senseless. Information technology must be used in organizational activities and processes in a way that leads to the creation of value for customers. If an organization can create a value higher than that of others for its own stakeholders using information technology, its name and brand will have such a position in the minds of its stakeholders that is not easy for the competitors to achieve. Customers are the most important stakeholders of any organization. Creating value for this group of stakeholders is a basic precondition towards creating value for other stakeholder groups

of the organization. In case an organization creates a value lower than that created by competitors, the contentment of this important group of stakeholders is decreased, and thus, they will go to other providers and competitors to provide their own needs. Then, the profitability and survival of the organization will be seriously endangered and thus, there will be no organization to create values for stakeholder groups such as stockholders, personnel, providers, government and so on. Price, quality and services are the most important aspects of value-creating in the customer's opinion.

#### **- PRICE**

Price is one of the most influential factors in a customer's decision to choose the product or service of an organization. An organization can reduce the design, production, sales, distribution and official costs of its own products and services using information technology. The reduction of the costs makes it possible for the organization to keep the price of its products and services at a low level and gain more profit through the mass sales of products and services. If an organization can have the lowest rate of costs in the relevant business compared with other competitors, it will be able to choose the cost leadership strategy in that particular business. Information technology can reduce costs through the automation of productive sales and distributional activities and processes and pave the way for the implementation of the cost leadership strategy. The automatic savings resulted from these activities in an electronic environment such as using mechanized systems and robots instead of manpower, promotions and marketing and network sales, electronic commerce using barcode system, using the electronic reception system, the electronic data interchange and so on, will reduce the costs and makes it possible to determine the price at the lowest level possible. Information technology reduces the need for physical and official places and makes it possible to carry out organizational activities remotely. Using this technology, it is possible to carry out procedures twenty-four hours a day and share the fixed costs with a larger number of products and services. Thus, the share of the fixed cost of each product or service entity is drastically reduced [9].

Using Internet, it is possible to establish communication with a large number of providers of raw materials and half-made products all over the world, choose the best price offered and then sign a contract. Networks also have an important role to play in the outsourcing of an organization. Nowadays, many of organizations have devolved much of their own work to others by establishing intranets with providers and subcontractors. An organizational activity is said to have been devolved when it can create the highest value in the value chain and carry out those activities for which it has sufficient core competency. In consequence, the products and services which are

offered, are not produced by a particular organization, but is produced by a collection of interconnected organizations. Now, there are more than 2000 companies and 12000 workstations in Intranet of the Hitachi and Ford companies respectively which are connected to one another [17]. In an intra-organizational network, fast and precise cooperation is of great import and this cooperation can not be achieved without using the information technology tools.

#### **- QUALITY**

Quality is another aspect of value-creation for the customers. Customers are constantly seeking goods and services with higher quality and any organization which can offer its own products and services with a higher quality will have competitive advantage over the competitors. "High quality" here means more and more accordance between products and services and customers' various and variable needs and the acquisition of their contentment.

Information technology influences on the improvement of the quality of products and services in different ways. Using this technology, it is possible to receive the market's needs and customers' views more quickly (through electronic surveys) and design and offer products and services to the market which are better, more appropriate and also more various. Producing various products and services accompanied by a faster supply compared with the competitors, makes it possible for the organization to be the first mover. Under these circumstances, if the competitors pattern and imitate the product or service offered by the organization, the advantage of being the first mover still belongs to the organization. Since ideas will be quickly and continuously offered to the market in the form of new and various products and services, when it comes to the final stages of the life cycle of a product or service, the new ones will be offered to the market and come to the stage of development. The advantage of being the first to move, leads to organizational good fame, customers' constancy and the creation of a sort of standard in the respective industry.

In an information era, time-to-market is considered as a strategic tool for organizations. Within a research, managers of 35 global companies found time-to-market as a critical factor in a global competition. Directors of AT&T, General Electric, Hewlett Packard's company confirmed that less time for planning, producing and delivering the product or serving a customer is a strategic advantage [8].

Information technology drastically increases the organization's flexibility in response to the market's new demands and conditions. This technology makes it possible to offer the organization's product or service as soon as possible. The information technology tools such as designing software programs have made it

possible to design products and services more precisely and appropriately [11]. Using this technology, it is possible to choose more efficient work forces and more appropriate providers in the market. Information technology has made the production of quite standard products and services possible through appropriate management and control of automation systems and quality.

#### **- SERVICES**

Services include other aspects of value-creation for the customer which have not mentioned in the two categories of price and quality. The aspects of value-creation for the customer in the category of services are very wide-ranging and different depending on the kind of products or services. After sales services, offering fast and accurate information to customers, fast communication with customers, fast delivery of the products and services, facility in paying for the products and services, etc. are the most important aspects of the services category [18].

It is possible to serve customers better and more through mass customization strategy. Mass customization means designing, producing and offering a product or providing a service based on the customer's need. Dell Company produces and distributes its products based on this strategy. IT makes it possible for an organization to have a close relationships with customers inside and outside of organization and make mass customization to be established in an organization [10].

An organization which can offer its services to customers in a way that using the minimum physical movement, a customer who can secure his/her maximum contentment, will be successful in business. If an organization can perform this procedure better than the competitors, it will gain competitive advantage in that particular business. Offering services using the information technology tools creates competitive advantage through the omission of the place dimension and saving in time. Expressing guarantees, constant communication with the potential and actual customers and offering the latest information to them regarding the products and services via networks, the electronic exchange of documents, payments and etc. will be possible at the least time and with the least physical motion using the information technology tools.

IT makes it easy for an organization to apply mass customization and time to market strategies. Taking advantage of these strategies, an organization will be enabled to have sustainable competitive advantages. Figure 3 shows these relationships.



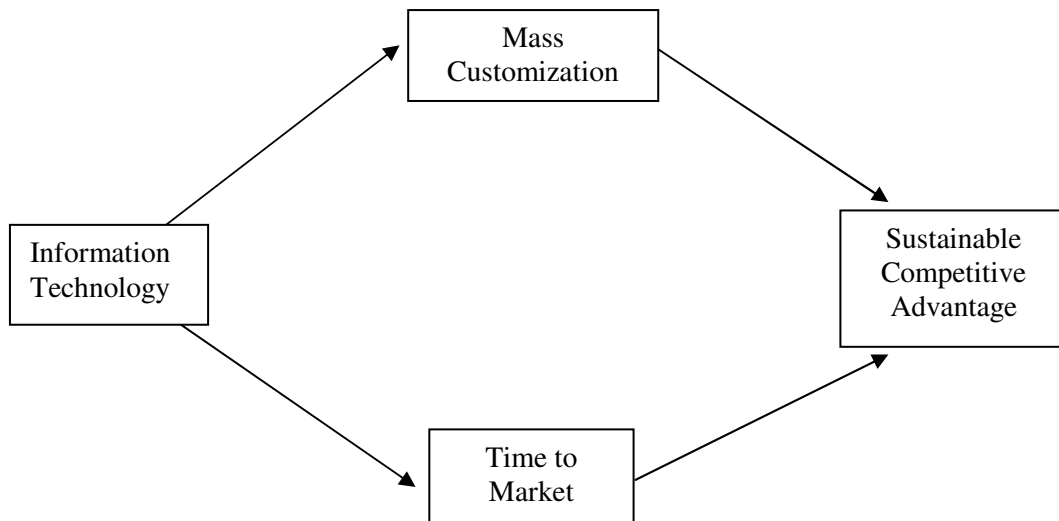


Figure 3: The relationship between IT and mass customization, time to market and sustainable competitive advantages.

The ability of quick and appropriate response to market and customer demand through using IT tools, caused more customer loyalty and possibility for repeated purchasing and also increasing customer's tendency to pay more money for the products.

### INFORMATION TECHNOLOGY AND THE RESOURCE-BASED APPROACH

According to this approach, an organization is a series of resources and skills which are used to produce products and services to be able to compete with competitors in a market. Sustainable competitive advantage in an organization is created through a proportionate and unique combination of the organization's resources and skills. According to the resource-based approach, organizations must build their strategies in accordance with their resources and skills so that they can be the best in that business and create the most degree of value for customers; a value not to be created by others. Creation of this kind of value is equal to the sustainable competitive advantage based upon the resources and skills.

The resources and skills can create sustainable competitive advantages with the following four characteristics:

1. Valuable: Sources and skills are valuable when it is possible to create a value for the customers, seize an opportunity or prevent a threat using them.
2. Rare: Resources and skills are rare as much as the organization's potential and actual competitors do not possess.
3. Unsubstitutable: Resources and skills can create sustainable competitive

advantage when there is no substitution for them.

4. Inimitable: Resources and skills can create sustainable competitive advantage when they are very difficult or impossible to copy or imitate. Resources and skills are inimitable when they are peculiar, formed in due course of time, not possible or very difficult and expensive to create, have a formation which is too difficult to understand, are created according to a relation among social phenomena and are related to the past structures of the organization.

Organizations must emphasize on resources and skills which lead to the formation and creation of a distinct competency and qualification [3].

#### **- RESOURCES**

An organization's resources include the physical, human and organizational capital. In the present era, called "the information era", information technology is one of the most important organizational resources. This resource includes hardware, software, communication networks and specialized work force in the field of information technology. Hardware, software and networks are short-living and quickly imitated and patterned. Thus, they can not create sustainable competitive advantage for an organization. American airlines systems which used information technology in order to achieve differentiation were immediately patterned and copied by the competitors [4]. The specialized work force in information technology can not create sustainable competitive advantage either; because organizations can easily employ the specialized work force. The information technology tools changed organizational structures, intra-organizational and extra-organizational communications, made the formation of virtual organizations possible, reduced the number of organization levels, increased organizational decentralization, changed open and informal relations in and out of organizations and increased organizational efficiency and effectiveness. Nevertheless, for the possibility of being copied and imitated, they can not create sustainable competitive advantage [2].

#### **- SKILLS AND ABILITIES**

The skills and abilities of an organization is the capability of appropriate implementation and combination of organizational resources in a way that leads to the best performance and highest competitive position in the business market for that organization. Skills and abilities put the resources in competitive status and they can not easily be copied and imitated.

In the category of information technology, we face two kinds of work force skills in organizations:

1. **Technical Skills:** These skills include specialties involved in the creation and implementation of the information technology tools. In order to make effective use of information technology in organizations, it is necessary to possess these skills; but these skills do not have characteristics of a resource having sustainable competitive advantage, because they are easily and quickly copied and imitated through individual staff training or employing the professional work force.

2. **Managerial Skills:** These skills include the ability to change the organization's business strategy into long-run architecture of information, the ability to understand and discover new and innovative functions of information technology in business, the ability to combine technical resources and skills and the ability to create synergy in organizational procedures using information technology.

The managerial skills concerned with information technology can not be imitated for the following reasons:

1. These skills have been achieved in due period of time and through experience.
2. These skills are originated by the managers' implicit and subjective knowledge.
3. These skills are causally vague.
4. These skills are complicated social processes [6].

It is better to institutionalize the managerial skills concerned with information technology in the form of teams in organizations because teams rarely quit an organization, individuals feel more content and secure when they are members of a team, continuous learning as a competitive tool is carried out more appropriately and optimum usage of resources and the creation of synergy in collective activities is done more appropriately [3].

In order to create a better organizational performance using information technology, there must be reciprocal interaction and interrelation among the factors causing this high performance in the organization.

In order to create sustainable competitive advantage and have a better performance using information technology, it is necessary to establish some sort of relation and interaction among organizational factors. Figure 4 shows the relation between organizational factors [5].

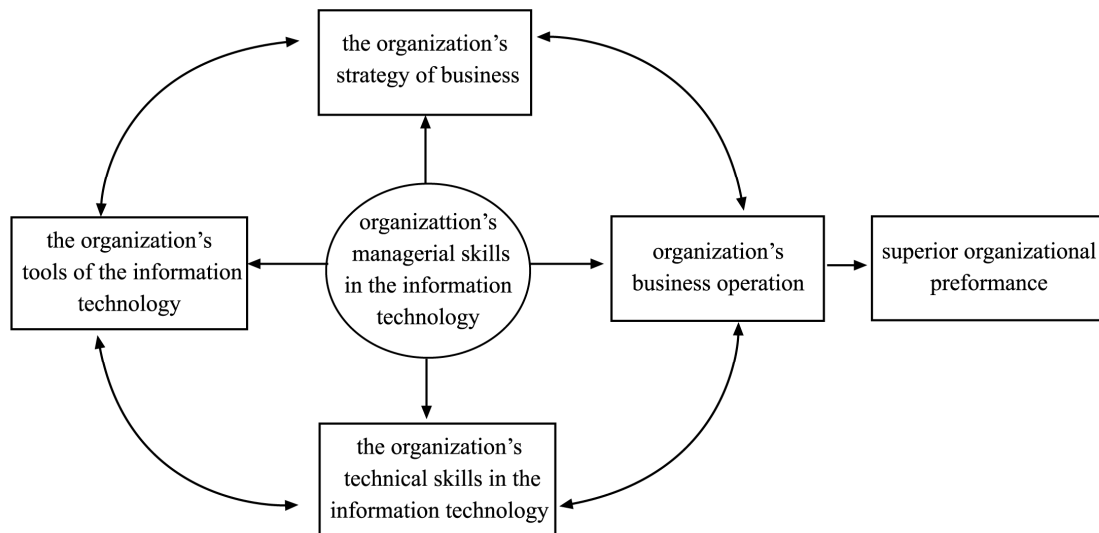


Figure 4: The relation between managerial skills, technical skills, the tools of information technology business operation and business strategy.

## CONCLUSION

Information technology has influenced all organizational activities and procedures. This influence is so much that in the near future, it is almost unconceivable to carry out organizational activities without information technology having a central role. Organizations which do not build their competitive advantage on the basis of information technology will eventually be omitted from the competition and activities field.

An organization can use information technology as a tool for creating sustainable competitive advantage that can do the following:

1. Use information technology to codify, execute and control the strategies related to organizational levels, business and operation to achieve the approval of the stakeholders (customers, stockholders, suppliers, the government, institutions and ...) through innovation and creation and achieve sustainable competitive advantage.

2. Make the best use of information technology to create the utmost value for the stakeholders and particularly customers, regarding the fact that these tools are extremely costly and have a short life cycle and constantly prepare new tools to substitute the old ones. Organizations must use the information technology tools to compete other resources and achieve the advantage of being the first mover by appropriate use of the information technology tools.

3. Combine the strategies, the information technologies and organizational resources and skills appropriately and simultaneously using information technology. This combination must be formed in a way that makes it very difficult and expensive for the competitors to imitate and copy and create a kind of synergy in the organization.

**ENDNOTE**

1. Ph.D. Student

**REFERENCES**

- [1] Ajhvan, P., "Implementation Business Strategy by Information Technology." *Tomorrow Management* (in Persian), Vol. 2, No. 7-8, p. 27, 2004.
- [2] Anderson, T. J., "Information Technology, Strategic Decision Making Approaches and Organizational Performance in Different Industrial Setting." *Journal of Strategic Information System*, Vol. 10, pp. 101-119, 2001.
- [3] Atkins, M. H., "The Role of Appropriability in Sustaining Competitive Advantage." *Journal of Strategic Information Systems*, Vol. 7, No. 2, pp. 131-152, 1998.
- [4] Ballu, M. et al., Available: at <www.computer-world.com/cwi/story2/10/95>.
- [5] Barney, J. B., "Firm Resources and Sustained Competitive Advantage." *Journal of Management*, Vol. 17, No. 1, pp. 99-120, 1991.
- [6] Dehning, B. and Stratopoulos, T., "Determinants of a Sustainable Competitive Advantage due to an IT-Enable Strategy." *Journal of Strategic Information Systems*, Vol. 12, No. 1, pp. 7-28, 2003.
- [7] Gantz, S. and Gens, F., "Dynamic IT." *Network World*, Vol. 4, p. 21, 2004.
- [8] Handfield, R. B., "The Role of Materials Management in Developing Time-Based Competition." *International Journal of Purchasing and Materials Management*, Vol. 13, No.1, pp. 2-10, 1993.
- [9] Hashemi, F. M., "State of Information Technology in Today World." *Mahnameye Sanate Siman* (in Persian), No. 73, p. 60, 2004.
- [10] Kahn, B. E., "Dynamic Relationships with Customers: High Variety Strategies." *Academy of Marketing Science Journals*, Vol. 26, No.1, pp. 45-53, 1998.
- [11] Mortazavi, M., "The Role of Information Technology in Manufacturing." *Mahnameye Tadbir*, No. 148, p. 16, 2004.
- [12] Nazari, M., "Saved Etlaaty: YK Olavit Nozohor Gahani." *Faslnamei olom Etlarasani* (in Persian), No., 78, p. 97, 2004.
- [13] Powell, T. C. and Dent-Micallef, A., "Information Technology as Competitive Advantage: The Role of Human, Business and Technology Resources." *Strategic Management Journal*, Vol. 18, No. 5, pp. 375-405, 1997.
- [14] Strebinger, A. and Traiblmaier, H., "The Impact of Business to Consumer E-Commerce on Organizational Structure, Brand Architecture, IT Structure and their Interrelation." *Schmalenbach Business Review*, Vol. 58, No. 1, pp. 81-113, 2006.
- [15] Tabb, L. "Who Said Technology is not Important?" *Wall Street and Technology*,

- Vol. 24, No. 10, p. 54, 2006.
- [16] Teo, T. S. H. and Rangathan, C., "Leveraging IT Resources and Capabilities at the Housing and Development Board." *Journal of Strategic Information Systems*, Vol. 12, No. 3, pp. 229-249, 2003.
- [17] Turban, E., *Introduction to Electronic Commerce*. New Jersey: Prentice-Hall, 2002.
- [18] Yagini, M. et al., "Moarefi Narmophzar Nohirit Ertebat Ba Moshtrian." *Mohnami A&re Fanavari Etlaat* (in Persian), No. 5, p. 112, 2004.
- [19] Zandia, R., "Seir Tarighi Karbord Fanavari Etlaat." *Mahnami Fani Mohandesi Aser Fanavari Etlaat*, Vol. 1, No. 5, p. 66, 2005.