Science Arena Publications
International journal of Business Management
Available online at www.sciarena.com
2017, Vol, 2 (4): 58-66

Technology, the key to survival in today's organizations

Anis Khaleghi
Department of Management, Master Of Arts, Rafsanjan Branch, Islamic Azad University, Rafsanjan, Iran
E-mail: aniss. khaleghi@yahoo.com

Abstract: *It is a long time since the issue of technology in organizations and companies as been discussed. Although after the industrial revolution, the advent of machine was raised more scientifically, even before the introduction of organizations today, primitive societies' life was connected to technology in some ways. This is because human has realized the vital role of technology in his life and inspired by nature and by musing over it has always sought to create tools and ways to facilitate accomplishing tasks and to liberate from the cruel forces of nature. All human progress is due to technology. It can even be asserted that technology is the tool for ensuring human life on this planet. As mentioned, technology is an independent subject and does not depend on the existence of organization, but as organizations are structured to meet human needs in today's communities, the importance of understanding and deployment of technology at organizational level is essential to facilitate access to goals. Given rapid environmental changes, technology is considered as a key factor for the survival of the organizations. In this article, we have tried to assess technology of organization from the perspective of James Thompson. Technology refers to information, equipment, techniques, and processes necessary for turning inputs into outputs. Thompson believes that technology makes possible adopting the proper strategy to reduce uncertainty. In his view, there are three types of technologies for the organization against the environment, which we will introduce and discuss.*

Keywords: *Technology , Technology of Organization, Human Ability.*

INTRODUCTION

The emergence of technology may date back to Stone Age. Making simple tools out of wood and pieces of stone has shown the first use of knowledge by human to develop technology for solving the problems of humanity. The discovery of fire that led to offering methods for cooking, heating, lighting and so on was another step in gaining technology. These technological developments make it possible for humanity to perform its tasks easier and faster. With the advancement of knowledge, Bronze Age emerged. Bronze Age showed that human ability to use materials has enhanced and he can use harder tools and objects and this continued, so that now human is in the Internet and computer age (Webster, 2012).

In the evolution of management knowledge over recent centuries and years, a sustained effort is seen to find common elements in decision-making and management of organizations, which has formed the basis of management. Progress of science and civilization in various fields of human life has always created growing complexity in terms of organization and management in organizations that has led to the revision of researchers of management sciences in originality of management theory. In his studies on organization, James Thompson states that the principle of logic would limit the scope of the operation of management and organization should only work in that area. One of the new features and typical phenomena of

Administration, which reduces the importance of logic of traditional theory, is the issue of "absence" by James Thompson and Professor T. Duncan that shows rapid advance of technology and environmental changes that are the main elements in the environment and working conditions of organizations. Finding common factors in decision-making and managing organizations need to adopt a scientific method (Bakhtiari & Raouf, 2009). Organizations play different roles in face of technology and some organizations form a kind of technology themselves. These organizations use the technology provided by others with some changes, and some others mimic the existing technology. What is important in the first place is that trying to create technologies needed is very difficult and its minimum prerequisite is having a strong and abled unit in research and development. Technology management in the organization means the management that has the understanding of selecting the technology needed by the organization at different times. Technology management is a set of interdisciplinary management majors that allows organizations to select the organization's fundamental technology to create competitive advantage (Field, 2007). Thompson believes that the technology used by organizations is the main technology; in fact, it is the technology organizations use to convert its resources into products.

Technology position in the organization

Today, technology integration exists in the turbulent world. Organization leaders cannot argue that without the use of technology, change and progress can be achieved because capable and smart companies undercut small companies that do not use to date technology. The evidence existing from the late 1990s shows that technology is not only a panacea to eliminate problems but also a tool that makes management effective and efficient. Technology enables the organizations to collect more data and thus adopt more appropriate decisions. Technology alone cannot decide but provides the context for growth and promotion of human decision (Mann, 2006). All organizations are known by two features in terms of structure and morphology. Organizational aspects are classified into two groups: structural and content

Structural dimensions represent the internal properties of an organization. They provide a base by which the organizations can be measured and compared.

Content dimensions represent the entire organization. For example, the size of the organization, type of technology, environment and its objectives introduce the status of the organization and affect structural dimensions (YarahmadiKhorasani, 2012).

What is technology?

Technology and its application have a profound effect on the development and organizational change. According to their type of activity, such as manufacturing plants, hospitals, universities, and other service, organizations use particular technologies .Technology is a combination of two Greek words "Techno" meaning skill and "Logos" meaning to build, talk, and word (IranZadeh, 2003). Technology literally means technique, trick, and skill (MohammadiQarasuyi, 2011). Technology as a tool continues to form a part of human life, but the introduction of technology as a means of production dates back to the industrial revolution in the eighteenth century to replacing human by machine rather force (Jafarnejad, 2009).

Technology usually bring to mind industry and machine, but experts generally believe that technology has application in any type of organization, such as industrial and service because all organizations convert inputs into outputs. There is consensus among experts that technology refers to information, equipment, techniques and processes necessary for turning inputs into outputs, but there are differences over the definition of a specific technology and measuring technology of an organization (Robbins, Persian translation; 2005). Many researchers have offered several definitions of technology that reflect a horizon and attitude that stems from their areas of expertise and research, so that from the perspective of economic sciences, technology is what turns inputs into outputs. In other words, it is the item used in turning input into output .

Some consider the use of machinery in the production process as technology, some consider it as the knowledge used in affairs and activities, and some others have dealt with human-social aspects of technology in production.

Webster Dictionary defines technology as "the practical application of knowledge especially in a particular field and capability given by the practical application of knowledge (Wikipedia, 2012). Technology is a method or process for managing a specific technical problem (Webster, 2012). Technology is the tools, methods, and operations used to turn consumables to product (input into output). Technology is nothing but the production process and machinery, practices, procedures and ways of doing things.Smanth and David consider technology as a concept, by which tangible or intangible products or services are produced and supplied to the market (Jafarnejad, 2009). Hodge's definition of technology refers science and art used in the production and distribution of goods and services. This is why technology is considered as art and science that in some cases, scientific and technical principles are applied with art. Field considers technology as the knowledge used in an effective and productive attempt, and Shoan considers technology as any tools or methods, products, processes, physical equipment or methods of doing or making, by which the capabilities of the human develop (Jafarnejad, 2009). According to James, technology enables choosing the right strategy to reduce uncertainty (Mahdavinia, 2009). Definitions referred to above mostly stress machine aspects of technology, whereas this encompasses only a small part of the definition of technology. However, some researchers state various aspects of technology: Navaz Sharif considers technology as a complex mix of four elements described below.

A) Hardware: a set of physical and machinery equipment

B) Software: a set of techniques, activities, practices and guidelines

C) Human resources: the ability to use hardware and software

D) Organizing and management: administrative, economic, and social mechanisms and arrangements, in contexts of which other components are used.

However, the components that Zeleny explains for technology are mostly in a framework that can be applied in the field of management. In his view, technology is composed of three interdependent components closely linked to each other as follows:

1. Hardware: this is the physical structure, logical deployment, or machinery used in carrying out the tasks set.

2. Software: Knowing how to use the hardware to perform the functions set

3. ManPower is the reasons for using a technology in a certain way.

Overall, the components of technology are information, equipment, and techniques. In other words, technology deals with how inputs turn outputs .

Given the common points in definitions, one can reach a general definition of the concept of technology that is applicable to all aspects. Thus, technology is the physical machinery and equipment (hardware), techniques, practices and guidelines (software), and the knowledge to use these tools in particular ways (ManPower) used to enhance efficiency in the process of turning inputs into outputs (conversion process).

The role and importance of technology in the organization

In today's world, by replacing new products, services, and materials with the old ones, saving the use of materials, autonomy of machinery, minimizing their need of manpower, shortening product life and aging rapidly, and continuing innovation, technology plays an important role in the market and competition .Technology and its use have a profound effect in the transformation and change of organizations. Organizations play different roles for technology.The emphasis is on the impact of environmental changes,

and these changes have intertwined competition between organizations more than before. With the arrival of new competitors to these areas, raging sea of competition is very choppy. Since available resources are very limited and organizations are passing the ruling they had over these resources in the past, the importance of efficient use of resources as a competitive tool is the focus of attention of the organizations more than past. This means that instead of looking for creating more new resources, they think of proper use of tools, methods, and knowledge and the correct use of the resources available, and in this regard, technology is considered as an effective tool to improve the efficiency of the organizations.Technology as an effective factor in conversion of input into output can have a pivotal role in productivity and efficiency of the organization. Thus, technology could help economic and efficient use of resources and raw materials and increase the amount and quality of production with constant resources (ZareiMatin, 2001). Consequently, technology improves the efficiency and production capacity of countries, leads to economic development and improves the living standards (MohammadiQarasuyi, 2011).

Advanced technology, provides new threats and opportunities for the organization. Moreover, technology is of the main causes of the willingness to achieve competitive advantage and improves the ability of organizations and countries in domestic and international competition. Porter considers technology as the major factor in improving the competitive position of firms and believes that technological development and change itself has no value, but the value of these changes arises from the fact that these changes are effective in competitive advantages of the companies (Jafarnejad, 2009). Given the importance of technology in the creation and survival of organizations, in their organizational structure, many organizations have a management called technology management (Brown, Persian translation; 2010).

In organizational and management studies, technology and strategy, environment, organizational size and life cycle, control power, and human resources form the factors affecting the organizational structure, and managers should consider these issues while designing the structure (Rezaeian, 2010).

Theories proposed about technology

Some studies have been conducted to explain the concept of technology and its impact on the organizational structure, of which the studies carried out by Woodward, Perrault and Thompson can be noted. By introducing three types of technology, unit, mass, and processes, Woodward examined organizational structure and studied the relationship between types of technologies and organizational structure, and showed that efficiency of the manufacturing companies in relation to technology and structure. By specifying two fundamental aspects of the technology i.e. the variability of the task (the number of exceptions the person faces in reduction) and analyzability of the problem (sort of procedures [normal or abnormal] search for answers of exceptions in jobs) and explaining art, industrialist, engineering, duplicate and unique technologies, Charles Perrault concluded that as the technology is more repetitive, organizations need to be structured at a higher level [high formality] (Robbins, Persian translation, 2005).

The result is that in designing the structure of their organization, managers should consider the technology (original), changes of technology, and the advent of new technology in their environment that could affect customers, suppliers, and competitors. For example, in industries that change rapidly and continuously in terms of technology, they adopt a more flexible structure (MohammadiQarasuyi, 2011).

Technology from the perspective of James Thompson

One of the tasks of managers that vast majority of experts have stressed in the field of management as a basic task of manager and with a great role in achieving the objectives of Thompson is coordination. James Thompson believes in the importance of coordination in organization and considers it in organizational design (Zahedi, 2001). He divides production systems into three types based on the nature of internal relationship and the relationship between different parts and the quality of coordination between them. Compared with Woodward and Perrault, Thompson does not follow the attitude of the effect of technology and structure and

believes that technology brings about the choice of a strategy to reduce environmental uncertainty. In other words, Thomson pointed to the fact that "technology makes it possible to choose the right strategy for reducing uncertainty" (Academic Site of Manager Assistant, 2012). Thompson states the issue of organizational structure as follows:

Components or principal components of a complex organization are determined by its structure. These important components are segmented or partitioned and communication is established between the units. This pattern of relationships and different units within the organization are collectively called the structure (Banshee, 2010).

He especially focuses on those components of organization that protects the technical core from environmental influences. Since structure is a basic means, by which organizations overcome rational limitations, coordination is achieved along with the protection of technical core. By separation of responsibilities, resource control and other tasks, organizations bring about the participation of their members by preserving the borders that have logical performance as well. Nevertheless, if the structure is logical, the coordination of independent elements should be facilitated through it. Thus, according to Thompson's theory, prior to understanding the organizational structure, one should pay attention to different types of interdependence and coordination between them (Banshee, 2010). The meaning of interdependence is the extent or borders that organizational circles (in terms of resources or raw materials) are linked together.If the interdependence is low, departments or organizational units can carry out their work without having consultations or exchange of materials, and if interdependence is high, organizational circles must permanently exchange their resources. Thompson has presented three types of internal interdependence: 1) Pooled Interdependence (independent), 2) sequential dependence, and 3) Reciprocal Interdependence.

Pooled Interdependence: dependence of collaborative work happens when individuals or units can work relatively harmoniously. What they do, does not depend on others, but success or failure of organizations depends on the unique contributions of each of the individuals in the organization. A number of experts often consider this kind of relationship dependent. For example, law firms and medical clinics are set so that any lawyer or doctor acts with autonomy (Banshee, 2010). Dependence of circles that are in this situation is extremely low, and work or affairs between units do not flow. Every unit is a part of the whole organization and plays a role in meeting its goals, but the work is done independently. In many organizations, there is interdependence (YarahmadiKhorasani, 2012).

Sequential Interdependence: When the dependence between organizations has a sequential mode, the pieces made in one unit enter the other as raw materials. This occurs when several things are done and they should be done in an order. Work progresses linearly through the production unit (Banshee, 2010). The first unit should function properly, so that the second unit works flawlessly. The dependence level of these units is more than previous dependence (Pooled Interdependence) because these units exchange resources and their performance is linked.

Reciprocal Interdependence: This happens when two or more people are mutually interdependent. Reciprocal Interdependence can be used for example in the production of work that must be done by two employees (Banshee, 2010). The existence of such a relationship means having the highest correlation between organizational departments. This exists in organizations that production of Unit A is as the raw material of Unit B, and product of Unit B returns to Unit A and used as raw material. These circles mutually affect each other's (they have mutual influence on each other. Thomson believes that "technology makes it possible to choose the right strategy for reducing uncertainty" (Farzipour, 2011), and for each of the dependence cases mentioned, it introduces technology in accordance with that condition.

Long-linked Technology: If tasks or operations have interdependence in succession, they are called long-linked technology (Farzipour, 2011). This suggests that different stages of the production of any product or service is mutually dependent, so that the process of tasks should be done with a defined order one after

another, and each part should do its tasks well to provide the needed and proper relationship between the affairs . Activity depends on previous activity, such as C dependent on O. In this technology, major uncertainty is related to the inputs (will we have resources?) and outputs (Will we have sales?) (Academic Site of Manager Assistant, 2012). Car production line in this case is a good example: first, different parts of a car must be produced and prepared, and then be placed in the supply chain. Thus, the structures should be designed, so that the affairs that are the prerequisite of production are taken into account and the necessary coordination are set between them. In other words, by establishing regular, mutual, and continuous interaction between production stages of a product or service, main uncertainty of the manager about the inputs and results (outputs) decreases and the tendency of the manger concerning finding solutions to the environmental uncertainty and applying controls in inputs and output systems increases .

Mediating Technology: This is a type of technology that links the customer to the inputs and outputs of the organization (Farzipour, 2011). This refers to a type of technology that is used in service institutions and leads to the establishment of relationship between client and agency, such as real estate offices and car sales (in Western societies) that are intermediary between the buyer and the banks, or employment agencies (official and unofficial) that introduce work-seeking people to respective organizations. Thompson argument on reducing environmental uncertainty is that as mediating institutions have more clients to introduce, they have more possibility of success in their work, so using deposit resources of the banks reduces. Mediating Technologies link independent units to each other. For example, wholesalers serve as intermediary between manufacturers and retailers (Mahdavinia, 2009). In such a case, the relevant departments or organizations can act independently and managers of organizations, structurally, need to establish rules and standards for conducting administrative activities, and there is not much need for continuous and daily coordination. Thompson argues that as intermediary institutions introduce more customers to organizations such as banks, factories, and institutions that need human resources, the degree of environmental uncertainty will reduce.

Incentive Technology(compact): This is giving a conventional response to a variety of different circumstances and contingencies (Farzipour, 2011). In this type of technology, uncertainty is lack of various resources, and by having various resources, managers respond to environmental uncertainty.The last type of technology that Thompson has introduced and is centered on using techniques and different ways of doing things. In this method, different techniques, methods and skills should be used at a certain time in order to achieve a specific purpose (Mahdavinia, 2009). Incentive Technology is usually used according to the needs of each situation. For example, in hospitals in an emergency, each patient needs one kind of care which is different from other cases, at the same time, mutual measures and interactions from intensive care are necessary.For example, in one case, it is likely that the output of action A is the input for action B, and return to action A again. A patient may undergo different treatments several times and imaged several times. Therefore, the structure required must create the possibility of creating horizontal communication, implementation, and consistency. In Incentive Technology, planning is required. However, the accurate prediction of the affairs to solve all the problems is not practical and daily interaction between the units is essential. The nature of using Incentive Technology requires managers and officials of various departments to establish coordination, use teamwork, and decision-making. In fact, in the use of such technology, the existence of interaction between departments and managers will be effective on the effectiveness of the organization. Thompson believes that the use of the features of this type of technology in the mentioned organizations can reduce the degree of uncertainty.

These three types of structures, including the rise of appropriateness and dependency, make coordination more difficult and expensive. Three methods of coordination in accordance with any one of a variety of dependencies listed include standardization, coordination with programs, and coordination through bilateral adjustment. Since coordination is essential but may be costly, organizations are searching for ways to minimize costs of coordination. This is achieved through structure that facilitates appropriate processes to coordination. Due to the actions taken in the light of norms of rationality and the efforts to lower the costs of coordination, organizations try to grant conditioned independence to organizational units: first as mutual, then as Sequential Interdependence, and ultimately facilitate standardization homogeneously. This hierarchy

was offered because the first group is not able to express dependence accurately. Therefore, the organization must find a means to link existing groups in larger groups, and any dependency that excludes this arrangement needs to determine liability or workers to overcome the problems of coordination (Banshee, 2010).

Technology and location plan

Technology affects the use of location in an organization, and thus affects many human communications in the organization. The quality of sequence of the various stages of production and distribution of devices associated with that process largely determine the degree of hobnob, closeness, and distance of staffing in the organization. This, in turn, can be effective in the formation of groups and behavior patterns. The results of a study about three hundred industrial enterprises indicate that the technology affects the quality of formation of groups, group behaviors, the relationship between groups, their problems, and their functions (Dunlop, the Persian translation; 2001). Some research also suggests the effect of technology in creating opportunities to adopt destructive and preventive roles, and yet other studies have emphasized the impact of technology in promoting a spirit of belonging and solidarity between people (Zahedi, 2001).

Technology and working hours

Technology also affects the number of working hours in organizations. The use of advanced technology in the long-term may reduce the need for physical presence of workforce and thus increase the staff leisure. Some experts believe that in reduced working hours, physical capacity of the individuals will be used less and thus staff fatigue will be less and managers will be required to make proper planning to use the power of thought and work. Thus, through new training, equip them to new knowledge and skills that meet the present needs and lead to upgrading environmental systems (Zahedi, 2001).

Technology and Ergonomics

The theory of close relationship of human with technique, and matching of the two to give the highest effectiveness and efficiency are essential. This is where the debate of ergonomics comes to play. Ergonomics is the study of the environment and working conditions of employees in the organization to enhance performance (Dunlop, the Persian translation, 2001). Given the need for consistency and balance between the interactive components in a system, there should be enough match and consistency between humans and technology. In the division of tasks and operations between man and machine, what is asked of man must be by considering his talents and abilities on the one hand, and limitations and deficiencies on the other (Maynard, Persian translation; 2001). Space and work environment should be designed in such a way that human energy is not wasted, and it is used the best way possible. It is in such a situation that labor cost reduces, safety, and job satisfaction increase, and thus productivity goes up (Zahedi, 2001).

Conclusion

The impact of technology use on organizations and finally, in communities is to the extent that as an organization or a society is equipped with the advanced technology needed, it will be more capable and successful. According to what was said, the quality of coordinating the activities of groups within the organization will be different based on organizational activities and the nature of the relationship between units within the organization. What can be stated as the result of this article is that technology and organization are related to each other and affect each other due to this of familiarity. In a system-oriented view, organization is a system consisting of interconnected components, each component interacts with the other components, and communication between components of enterprise system requires match and correlation between them. Obviously, technology as one of the inputs of organizational system should have match and homogeneity with other components. Techniques applied in the organization are in relation to the people who use the techniques and internal and external environment of the organization. In other words, technology should interact with those subsystems where the organization is inscribed, homogeneous, and

harmonious. Thus, technology is a means to achieve organizational goals. However, a means that occasionally, incorrectly, replaces the target, disrupts the order of systems, and makes system components disproportionate and unbalanced. Wherever means and aims are replaced, virtual targets oust the main objective from territory and ground and will have no results but disruption. In designing organizations, to facilitate coordination between different organizational units, Thompson recommends that one should note the relationship between businesses, place related and close ones in one group, and employees of these businesses should be supervised by one supervisor.

References

1. Alwani, M., Danayeefard, H. (2001). Discourses on philosophy, theories of a government agency, Tehran, Safar Publications.

2. Iranzadeh, S. (2003). Globalization and strategic developments in management and organization, Tabriz, knowledge horizon, Second Edition.

3. Banshee, A. (2010). Philosophical theories of organization and management, Web-based article: http://dc375.4shared.com/doc/4oa0e55k/preview.html.

4. Bakhtiari, A., Raouf, M. (2009). Principles of Management, Web-based article: http://abakhtiari.blogfa.com/post-5.aspx.

5. Brown, A. (2010). Technology base, M Zanjan, Tehran, Industrial Management Institute, first edition.

6. Jafarnejad, A. (2009). Modern technology management, Tehran University Press, Printing, Tehran.

7. Robbins, A. (2005). organization theory, translation by Mehdi Alwani and Hassan Danayeefard, Tehran, Safar, Tenth Edition.

8. Rousta, A. et al., (2009). Marketing Management, Tehran, side, Fourth Edition.

9. Rezaeian, A. (2010). Principles of Organization and Management, SAMT Publications, Tehran.

10. ZareiMatin, H. (2001). Principles of Organization and Management contingency approach, Tehran University Press, Printing, Tehran.

11. Zahedi, Sh. (2001). Technology and Organization, Journal of Management Studies, Spring, No. 1, Tehran.

12. Davenport, T. and Prusak and Larsh. (2011). Knowledge management, translation by HosseinRahmaniSeresht, Tehran, Psycho publishing, printing.

13. Academic Site of Manager Assistant. (2012). Technology and Organization, Web-based article: http://www.modiryar.com/index- management / general / structure / 4801-July 14, 2012 -07-19-21.html.

14. Alagehband, A. (2005). Theoretical Foundations and Principles of Educational Management. Tehran, Sixth Edition, Bethat Publications.

15. Farzapour, R. (2011). theory and organizational structure design, Web-based article: http://mbacenter.persianblog.ir/post/75.

16. MohammadiQarasuyi, A. (2011) Technology, Web-based article: http://www.pajoohe.com/fa/index.php?Page=definition&UID=33011.

17. Mahdavinia, Z. (2009). James Thomson Research on the effect of technology on architecture, Web-based article: http://khalijfarsjudoschool.blogfa.com/page/jimztamson.

18. Hersey, P. and Blanchard, K, (2009). Management of Organizational Behavior, translator Ali favorite paragraph, Amir Kabir Publications, Tehran.

19. YarahmadiKhorasani, (2012). Management theory, Web-based article: http://athir.blogfa.com/post-4210.aspx.

1. Wikipedia, the free encyclopedia, .2012. Technology management: http://en.wikipedia.org/wiki/Technology_Management.

2. Field, R H G, .2007. Richard Field on Management and Information Science http://apps.business.ualberta.ca/rfield/Organizational%20Effectiveness,%20Structure,%20and%20Technology.htm.

3. Webster's New World College Dictionary, .2012. A Closer Look: Definition of Technology, http://reference.yourdictionary.com/word-definitions/definition-of-technology.html.

4. Mann, A, .2006. Managing Technology in an Organization: http://ezinearticles.com/?Managing-Technology-in-an-Organization&id=267658.

5. Markgraf, B and Media. 2011. How to Introduce New Technology to an Organization: U254: New Technologies and Alienation: Some Critical Reflections.

6. Dunlop, John, T.2001. "Industrial Relations systems" HenryHoitand. Company, New york,1985, p.7.