Innovation and Training in Engineering Management: An Essentiality, a Necessity or a Choice?

Seyyedeh Hashemiyeh Mirrezaei¹, Ali Mosallanejad², Abdolhossein Ayoubi³, Fatemehsadat Mousavifard⁴

¹M.S. in IT Engineering (E-Commerce) in Islamic Azad University. Researcher of Modern, Iran.
²M.S. Student in IT Engineering (E-Commerce) InIslamic Azad University E-Campus, Iran.
³M.Sc, Biomedical Engineering Department, Amir Kabir University, Tehran, Iran.
⁴M. A. English Literature Department, Islamic Azad University, Arak, Iran.

Abstract

Recent chaos which is the consequence of traditional structures in industrial organizations brings about negative consequences for engineering and technical training system and several challenges are the gifts of such situation. In such organizations in which educators waste a lot of time to cope with, a great amount of recorded organization knowledge is not used and education system loses energy under the effects of decisions made in organization before. The question is that how innovation enables the organization to achieve long term competitive merits in such a variable business world. In this paper, by focusing on different aspects of innovation, the role of innovational management in educational systems of technical or engineering industrial organizations will be elaborated.

Keywords: Innovation, Educational Innovation, Engineering Training, Strategy.

Introduction

Disarrangement derived from customary structures in industrial organizations will result in negative consequences for technical and engineering educational systems and caused various challenges. In these structures in which educators allocates a large amount of time in coping with, a lot of organization recorded knowledge will be missed and side effects will eventually prevent organizational decisions made before.

In today’s world, while industries are on the rise corresponding to technology development, there exists some challenges such as fast evolutions of technology, depolarization of the world, flexible production, automation, Information technology wide application in industry, production of products competitive in global market, non-oil economics, etc.[1] the mentioned challenges on one hand and organization’s need to stay on its rank even to improve it on the other hand caused the important and strategy concept ‘innovation’ to require special attention in management process of engineering educations and trainings.

Since, achievement of such goals involves change and reconstruction and technical and engineering educational systems; regarding this approach the question is that how innovation can enable industrial organizations achieve long term competitive merits. In order to accomplish this question, following considerations should be examined:

- Identifying trainings which involves novel ideas
- Clarifying new paradigms which can grant a focal point to new approaches
- Conservative destruction of customs which restrict creative thought
And finally, presenting samples and comparisons which assist redefinition of what seems possible.

By examining and performing above suggestions a proper background for responsiveness is prepared.

By this approach, innovation concept in engineering trainings will be discussed in the first section of the paper. In the second part, essentials and necessities of training innovations are discussed. Studying current challenges and processes by which innovation are shaped in system of organization’s technical and engineering education constitute the main pivot of paper’s third part. Following the paper, expected achievements are discussed; summing up the discussion some suggestions are presented with the hope of enjoying improved educational innovations in management.

Terminology

Innovation

Thompson identifies innovation as a process during which organization selects a better choice or even a different one and brings it into practice in order to eliminate shortcomings of the selected approaches or to improve them [2]. Butler expresses innovation as establishing new alteration in organization strategy based processes [3]. Based on O'Reilly, innovation is the result of ‘internal development resulted from research and development, thought of managers and employees on how activities are flourished’ and ‘changes in competitive essence’ [4].

Training Innovation

Educational innovation can be identified as not going after principles, processes and habitual trainings or in other words, it is knocking off usual forms of tasks [5]. Based on this definition, innovation includes factors such as “target setting and planning”, “motivating and synchronizing attempts”, “arranging and controlling over activities”, “resource allocation”, “putting knowledge into practice”, “establishing communication and relationship development”, “talent discovery and assist their promotion” and “stabilizing external demands”. Stewart believes educational innovation as accessible knowledge in education systems; it brings advantages forth, and augments educational systems capabilities in supplying addressees with their needs [6]. He considers educational innovation enjoying four primary pivots:

- Opportunities which are novel on nature.
- Processes which decreases costs.
- Revolutionary ideas which optimizes relationships and data.
- Structural changes which boots the quality and reduces the costs.

Innovation in Engineering Education and Trainings

The most significant way in bringing efficiency to technical and engineering Trainings seems to be reproducing dominant processes. Processes such as determining the needs, planning, administration, and evaluation are simulators which transform principle-based educations to daily actions. Extraordinary emphasis on instructions establishes laws which dominates over the task and involves education systems. The greatest challenge seems to be presenting novel ideas.

Some issues such as uncommon thought, updated principles and paradigms and eliminating limiting prodigious are influential in engineering education and trainings as much as they are crucial in other types of innovation. Authors believes that educational innovation as a part of creativity can act as the basis of new principles just when it motivates revolution in customary believes which surrounds a border of active and regular processes and methods and results in sustainable competitive merits. In such a situation, a management system based on innovation is considered as the best way to establish coordination between strategy and structure.

It empowers the technical and engineering training systems to identify cause and effect relationships which results in values being internalized in education and training. Thus, a unified innovation-based system settles a pattern and a unified language for composing and transferring data on defining value for education and training. By this approach, following purposes are obtained more effectively and faster for technical and engineering education systems:

- Knowledge of scientific foundation of principles and mastery over fundamental studies
Applying updated engineering training methods (analysis, calculations, modeling, experimental design and studies) and making use of experiment

Identifying pressures of cultural and economic factors related to engineering systems

Sensitivity to technical responsibilities, organizational capabilities and presenting novel ideas

Developing professional engineering patterns in organizations and their arrangements [1].

Flores, Nayak and Sayles consider the following factors as effective ones on creating innovation in educations and trainings:

- Managers and employees’ tendency in abandoning current knowledge.
- Strategic connection of organization with engineering trainings.
- Stopping investment on customary programs and methods.
- Focusing on customers needs.
- And organizations’ acquisition ability [6].

The above mentioned factors are used in both dynamic and abstruse environments. Since a dynamic environment is unpredictable, requires an organic structure and due to its complexity it needs decentralized structure.

Generally, the essence of training innovations should match with organization’s real engineering needs and it should provide the organization with quantity and quality developments by granting the environment cultural-economic acceptance and preparing technical knowledge background. Since, engineering scientists and engineers’ activities should be focused on the country’s framework of needs, thus a logical and strong relationship should exist between innovation and the country’s training system so that a proper condition be provided for organization’s engineering training system [7].

Types of Innovation in Engineering Trainings

Although innovation in engineering trainings is related to its processes alteration, but its greatest part relates to gradual change in structures or a combination of techniques, ideas and methods. Thus, three types of innovation are introduced:

Subject Innovation

Most of subject related innovations include gradual changes which add new features or mixture in subject or context. These types of innovation always exist due to necessity of students while it can add to organization’s competitiveness.

Procedure Innovation

It includes methods and approaches of planning and training administration; this innovation is observed regarding resulted changes in costs and quality of training. Procedural innovation includes gradual changes and betterment which decreases costs and improves quality.

Combined Innovation

This type of innovation is a combination of topical innovation while it is related to processes; it will increase the rate of effective communication with engineering societies by improving the quality and quantity of training programs; awareness of updated changes, new skills and the ability of making use of skills and novel engineering assists facility in accomplishing professional tasks[5].

Innovation Significance

Innovation depicts the necessity of development in modern trainings, updated processes and new customers which are considered as the necessary elements in strategy development. These changes cause new behaviors and value which organizations are depended on. The first step in engineering training strategies seems to be setting the change program which involves the whole organization strategies to achieve it.

This approach involves innovation in behavioral changes including attention to customer and results which displays the necessity of technical and engineering training for degenerating value. On the other hand, four internal behavior including understanding strategy, value and commission, establishing responsiveness culture, free communication, and team work insist on the necessity of innovation. In order to describe the strategic role of innovation, a unified program is necessary for supporting spiritual properties of organization.
When organization’s training activities are focused on engineers, a professional atmosphere is developed and technicians who work in different units choose engineers as their occupational pattern. No doubt that pivotal professional structure is useful for any units to achieve in duties. But in practice, different units individually attempts to seek innovation and they compete together in finding access to organizational resources. Accordingly, the necessity of attention in developing training innovation can be answered with three questions.

In which technical transactions there can be no achievement in organization?

There is a tendency in escaping problematic transactions which are considered as stimulus of innovation. For instance, development in engineering training indicates two contradictory aspects of extreme decentralization and regular management. Maybe, it is understood that organization’s excessive interest in maintaining current status influences investment in new and revolutionary ideas or maybe it comes to mind that organization increasingly loses vitality in search of competitive merits. In such situations, both of choices can be selected not just one of them.

What is the Main Weakness of Engineering Trainings?

This question tracks a series of weaknesses. Some organizations react improperly regarding the rapid changes. In fact, the least usage of innovation, a convenient environment and dynamic trainings is observed.

What are the Challenges Confronting Technical and Engineering Training Systems?

Rapid changes, customers increasing power, rivals with lower costs and thoughtful customers who consist a new generation of customers; they are not optimist to receive proper services from organization. The above factors require innovation both in management affairs and in training innovation.

Effective Factors on Innovation Processes

They are categorized in two main groups: internal factors [empowering organizations in trainings to facilitate development and creation of revolutionary processes in engineering knowledge] and external factors [sability in identification and presenting proper knowledge with engineers’ needs]. But the point is identifying innovation’s main requisite? Who is its administrative processes’ organizer? Innovative programs are programed in the structure of which strategy and they are run with which purposes? How are done activities traced and evaluated?

Any response to these questions require fundamental changes in culture, leadership approaches and creation of training value while prerequisite of such changes should be provided. Any of the factors are discussed in details later.

Cultural features

Culture creates tendencies and predictive behaviors which shapes training systems practice method. Mostly, culture identification allocates the first place of importance to growth and training. Studies indicate that innovation cannot improve function due to lack of cultural incompatibility [3]. Now, the question is that it is culture which imposes strategy to organization or it is strategy which results in culture? Xavier Greffe believes that strategy influences on culture.

Training systems should introduce tendencies and new behaviors to engineers to achieve in strategy. Charles A. O’Reilly knows eight factors effective on innovation culture including: risk taking, attention to details, result-based views, competiveness, support, development and reward, teamwork, and decision making[8]. Based on the definition, authors believe that innovation calls fundamental changes in different aspects of engineering and technical training systems. To do the task, attention to tendencies and new behaviors act as prerequisite of such changes.

Leadership Qualifications

Leadership of fundamental changes is a necessity for an innovative organization. Some organizations make benefit of two approaches ‘a process for promoting leadership’ and ‘defining a model which elaborates leaders’ features. Both of these approaches are focused on particular qualifications which leaders should be
equipped with. These approaches instead of studying leaders development aims to describe them as they are [5]. Such approaches identify leaders' behaviors which highlights their superior features. Thus, revolutionary leaders can play roles of ‘creating value’, ‘innovation seeking’ and human capital development’. Leaders who pay attention to innovation and value creation, they promote technical capital of organization with cultural programs; indeed, improving available capacities supports innovative purposes.

Creation of Value

Innovation, risk taking in engineering and technical training systems stands in the first place in adjustment with changes and revolutionary thinking style. Full attention is dedicated to customer and better performance, quick and low cost activities are also emphasized. For instance, Sony Co. Ltd. claims to view the world via the customer window. This viewpoint assists them to predict future needs and opportunities [8]. Another example, Microsoft asks managers, engineers and other employees to present a value-based service to customers and to connect with external groups in finding new ways of adding value [5].

Organization’s Strategy

Innovation in engineering trainings develops by four unique development strategies. First, organization’s committee, approaches and values should be defined. Second, responsiveness and arrangement link strategy with innovation. Third, it improves and controls organizational communications, common beliefs, standards, and values and finally, teamwork directs individuals and different cultures of organization.

Harmonized Trainings

Arrangement is a necessity for innovation in all its forms [9]. All interconnected factors should clarify a pre-defined aim, a common perspective and a determined understanding of innovation effect on improvement of organizational trainings. Harmonized training encourages innovation and risk taking and leads training system activities to achieve important purposes. The essential item here is knowledge and encouragement. In other words, all effective factors on engineering trainings should depict strategic purposes in a way that all interested individuals understand it and managers be certain of individuals and teams achieving supreme purposes which may assist innovation [10]. Advanced industrial organizations make use of engineers measurements to evaluate understanding of innovation and the amount of awareness, and by connecting personal goals and business aims and plans, a strategic arrangement is achievable.

Innovation

In engineering trainings, innovation is considered as the most significant factor in presenting new products. Believing innovation as a common talent, by presenting proper development programs, the unique feature of programs which can be mentioned as creativity can be continued.

Education experts believe that seven principles below can lead to innovative trainings:

- Achieving creativity features, awareness and creativity attitude.
- A proper understanding of innovation.
- Participation in innovative activities.
- Improving creativity processes.
- Improving personal features regarding innovation.
- Being master in innovative techniques and moral principles.
- Improving creative abilities.

Of course, for presenting new ideas which are accompanied with trust and necessary tendencies, prerequisite should be provided. Otherwise, without favorite situations, motivation and encouragement applying revolutionary ideas seems impossible [11].

Foresight

Advances in science indicate that without a future plan, participation in organization development and access to predetermined strategies may be trivial; it may even results in failure.

Foresight is not matter of wasting time; it is one of the most significant issues in science, research and knowledge [11]. Predictions indicate changes in politics, society, culture and industry which is representative of rapid changes in future era, creativity and presentation of novel ideas and methods.
This belief should be apparent in organization’s training strategy so that educators be certain of a plan before training so that they believe innovation and foresight as a culture of activities.

Challenges
The most important predictable challenges in developing creativity in training can be mentioned as follows:

Uncertainty in Needs and Priorities
Reason of such challenges refers to conventional structure of technical and engineering training systems. This issue has caused different units of organization evaluate themselves in this field. Choosing issues with unknown and priorities or non-sufficient clarity are considered as the most important consequences. Some of the trainings which are planned and run in this way confront several problems:

• Selection of daily administrative activities as training priorities.
• Emphasis on trainings which needs a preliminary evaluations.
• Selection of classic topics which are not effective enough.
• Emphasis on topics with ambiguous and non-function definitions.

Any of defects mentioned above in addition to prioritizing needs and providing a proper background for training, different decision making centers, attitude and communication gaps among these centers and lack of trust among majority of engineers regarding the role of such trainings in improving knowledge based roots are considered as factors which result in a long term failure of technical and engineering inefficient systems.

Lack of Connection Between Aims and Plans
As mentioned before, the main problem of technical and engineering training system is that they enjoy conventional structures. It should be mentioned that it is the duty of organizations’ training unit. Some units believe that since provision of needs via this path is infected with bureaucracy and proper time of training may be lost, so planning and administration of training should be done personally.

Improper Facilities and Equipment
Another limitation related to engineering trainings is lack of professional usage of facilities and equipment. Regulations regarding optimal the least usage of facilities caused the precious time of education system be allocated to solving trivial problems; this is the reason why they prefer to allocate their trainings to be based on theories which will not grant high levels of scientific value to them and will not consequently be in focus of scientific societies.

Indeed, financial limitations in providing facilities and equipment, holding professional opportunities based on facilities not identified needs, directing sources and facilities toward theoretical and short-term opportunities, unbalanced distribution of financial budget and lack of instructions for using equipment caused engineering trainings to be not well-applicable.

Domination of Justified Trainings
Infirmitry in identifying problems, lack of thoughtful vision, lack of proper use of theoretical foundations, not prioritizing, poverty in backgrounds and methodology, lack of tools and facilities for holding training sessions are considered as factors involving in ineffectiveness of trainings.

As mentioned before, lack of defining priorities and lack of connection between educational subject matters and organization’s needs caused a decrease in quality of training. Maybe the reason can be traced in the quantity and a rash in competition with organizations in the same level regarding the number of held opportunities regardless of the quality of these opportunities or their effectiveness. In fact, training and education should be a means of achievement in scientific goals and
problem solving while today it is just a goal itself.

The other challenge is in fact lack of engineers’ trust to organizational trainings; thus, they avoid reporting their organizational needs to training system.

Although, in order to solve this problem, some organizations created experts groups, still there is lack of a comprehensive program for permanent and persistent communication between training system and engineers’ group in organization and the activities and movements are mostly temporary and self-managed. Bureaucracy dominating over planning and its administration are considered as welcoming.

Lack of Communication Systems

One of main challenges is lack of an approach which provides a proper direction; usage backgrounds should be provided via a worthy amount of trainings. Lack of arrangement in this section will cause a similar activity be repeated in an organization which has several agencies or they are unaware of each other’s program; scientific products may face delay or library shelves and computer systems may changes to a store of trash data.

Deficiency in Data Transmission and Documentation

Few number of data centers, restriction in access to scientific sources, improper band width and problem in rapid access to internet, limitation in access to successful national or international samples are considered as the most important challenges of technical and engineering training systems.

Of course, the problem is not with data sources; the matter is in organizational, national and international level; weakness in aggregation, documentation, storage and distribution causes inconveniences in consumers’ access to data and may lead to quality or quantity decrease and fluctuation in decision making processes. On the other hand, insufficient financial support, few experts in librarianship, incorrect regulations in libraries and their data centers are among troubles interrupting real function of technical and engineering training systems.

Lack of Trust in Effectiveness of Trainings

Since a large amount of industry in Iran is of import type and technology transmission is done through montage; thus it was never felt necessary to arrange policies and instructions based on scientific chapters. In recent years, some efforts were done to improve training status, but some reasons such as vulnerability of policies and lack of strategy for training and thus lack of a comprehensive plan has caused officials especially engineers to doubt in programs’ effectiveness.

Other challenges can be mentioned as:

- Receiving no support from senior manager,
- Low level of tolerance against current procedures;
- Short term goals;
- Logic development and excessive bureaucracy [12];
- Lack of clarity in costs and
- Lack of organizations’ serious cooperation and lack of attention to favorites
- Lack of connection cultural, regional, human and organizational elements with innovation
- Concern about any probable organizational incompatibility
- And ambiguity in future [13].

Innovation Processes in Engineering Trainings

In this section, an explanation in how creative processes in technical and engineering training systems are formed and developed based on challenges. The process which is based on skill, talent, and approach is completed in 12 steps.

Strategic Fields

All active units of an organization are considered significant for the organization and some fundamental needs are provided by them. Although it should be true in all organizations, most units didn’t achieve in creating distinction. Thus, the main duty of training system is flourishing potentials of those employees who enjoy greater influence in achieving organizational purposes. Influential strategies should be identified based on their impact on organization and they should be brought in middle of attention.
Training System and Strategy of Organization in a Team

There should be a convergence in training system and organizational strategies so that by evaluating the system, an approach be presented for engineering trainings. Although, effectiveness of this simple pattern is proved, training system should apply a unique strategy which is reflective of organizations’ purpose.

Thus, there is a necessity to select a List of approaches which is most likely predicative of success in determined strategies. Such a list provides an opportunity to view all customers, addressees of training system, and officials from different angle. Diversity in perspectives helps prevention classic traps. Any organizations who forget providing opportunities are in danger of losing precious elements which increases their vulnerability. Being in accordance with general strategies of organization assists training system to elaborate guidelines and starts a journey from general ideas to specific opportunities of innovation seeking [4].

Burning Conventional and Trash Beliefs

In order to be certain of a proper understanding of scientific advances, conventional principles should be left behind. Actually, some parts of what is accepted as scientific facts are semi-science which are followed blindly[6]. As a researcher evaluating innovation, any old belief should be tested by two questions? And second, is it possible to substitute another fact with the old semi-science? If other management principles are under criticism, then it is clear that they have no scientific basis and avoiding them is the key to innovation.

Innovative Plans

This is the tight time to present a list of innovative ideas for evaluation of the fact that if presented ideas are in a range with identified fields or not and if a comparison list is convergent or not. This will lead innovative programs to be administrative and we can match them to organizations’ strategies. In this stage, ideas are presented based on experiences, knowledge, surveys and even suggestion of other groups.

Policy makers in training systems usually treat well with revolutionary ideas and believe them to be efficient. But an important point is that acceptance of an idea or introducing a new method is considered as effective in solving challenges and they are start of the path but not all the trodden path. Thus it is necessary to study balance of innovative trainings with potential features of engineers. If the idea has no balance with knowledge, awareness, interests and engineers’ abilities, there would be no hope in its successful administration. In other words, it is essential to study innovation distribution environment before its approval [12].

Harmonizing Innovation with Organizational Features

In this step, it is aimed to increase innovation value based on science and technical scales. Providing a balance between idea and environmental condition and engineers features will improve innovation acceptance rate. Rogers and Shoemaker believe that educational innovation enjoy five features: [13]

- Relative advantage: engineers understanding of innovative effectiveness amount can be function of its acceptance result such as convenience, organizational credit and satisfaction;
- Compatibility: balance of innovation with experiences and defined values;
- Complexity: level of difficulty, innovative learning and productivity in work processes;
- Tri ability: possibility of testing innovation in a limited size and evaluation of test results;
- Observability: accessibility of innovation results for operators.

Based on mentioned features, it is necessary to edit the concept of innovation in accordance to operators’ understanding of the concept so that majority of features are included.

Change in Conventional Roles

No doubt that training officials play an important role in improving technical and engineering training system regarding innovation and development. Resource allocation is a fundamental step for innovation as a motivation [15]. They need to cooperate with owners of revolutionary ideas for solving complex major problems. In general, managers who supervise on
revolutionary approaches should negotiate with engineers who applied or designed those approaches. Irregular sessions will bring delay to improvements or may cause major decisions to be made regardless of main operators' (engineers') ideas.

**Structural Preparedness**

Technical and engineering training system needs to evaluate its qualifications in order to be announced as innovative-based zones. In such evaluations, general approaches, function evaluation and individuals' potentials are all measured. These evaluations lead training system to receive a significant feedback from their function and current qualifications based on determined goals and strategies; as a result, system can present practical approaches for development of capacities. Since importance of structural preparedness, this is different from conventional functional management. In advanced organizations, introducing innovative programs with a structured strategy proved to be successful. Strategy in center of innovation clarifies gaps in technical knowledge [4].

**Team Work and Knowledge Distribution**

Nothing seems worth than using a novel idea just once. Members' unified knowledge of an organization worth other proprieties. Majority of organizations make use of knowledge management system for knowledge arrangement and its distribution. Innovation requires data aggregation and distribution which is applicable to individuals. In order to transform specialized knowledge to distributed one, cultural change seems necessary. This can be done via following steps:

- **Knowledge Organization:** Data can be in access in the whole organization.
- **Knowledge Development:** Engineers should review any information delivered to the organization and check it out. Data validity is increased and their best application is suggested.
- **Knowledge Distribution:** the main challenge is finding a motivation for engineers in order to make documentation of ideas and knowledge possible so that it gets accessible to all. This way of thinking is so simple, but its administration is difficult. This intense circumstance is not observed in organizations using innovation in their strategies since they introduced work team and knowledge distribution as strategic priorities of development and learning [3].

**In Search of New Principles**

Society-wide and unpredicted challenges cannot be solved through conventional approaches. Facing challenges following suggestion may be efficient:

- Ability and function of team-works should be managed and equally distributed;
- Training system should be self-organizing;
- Authority and domination over training system should be distributed;
- Training system needs to be self-organizer;
- Training system should combine cooperation and collaboration;
- Training system should be really flexible and sustainable;
- And cooperation should be done equally in both sides.

Searching new principles accompanies two simple questions. First, where can be found the features and capabilities favorite for training system? Second, what should be done in planning in a training system with high compatibility?

**Ideas to Reality**

In order to transform convention-breaking ideas to reality, it should be well-understood how to confront processes and overcome them. Determination of administrative steps assists its achievement. To do the task, at the beginning of any innovative program, following questions need to be respondent:

- How are the current training-educational processes?
- How is it changed?
- What is the aim of this change?
- What are the success scales in this field?
- Who are the addressees of the process?
- Who attends and cooperates in the process?
- What are the input data and information?
- What are the analytic tools applicable, here?
- What are the events and steps of the process?
What decisions are necessary to go forward in this process?
What are decision making scales?
How are these decisions linked to other management systems?[3]

After documentation of details in each stage, a list of interested parties is provided and they are asked to elaborate their ideas regarding the effect on innovation challenge. The responses assist edition of innovative training programs.

Supporting Innovation Implementation
When training system welcomes innovation, support is required. This support has found financial, scientific and administrative dimensions. One of the most important kinds of supports is presenting the necessary trainings. It is taught to those who prefer innovation to practice. This awareness is at the level of awareness for practice [12]. Supervision is also considered part of support.

Feedback and Revision
Distribution of innovation requires time. In other words, innovative programs should be implemented actively to adjust themselves to environment. Since, distribution of innovation is not predictable so it should be managed so that before any rejection or reformation, necessary changes get implemented before [12].

This requires designation of feedback path. Feedback increasingly provides possibility of permanent revision, edition and adaptation of innovation in the environment and facilitates its acceptance and development.

Expected Achievements
Focusing on creative programs in technical and engineering training systems provides the opportunity for organization to act innovatively and not to perform reluctantly in shaping its knowledge in future. It will assist the organization to choose a more logical and regular approach or new choices and to define a worthy strategy for function improvement. Innovative programs enjoy some merits including:

- It helps training system in identifying novel methods and continuous improvement of training
- Setting proprieties makes possible improvement in processes and culture of innovatively
- It leads training path from irregular processes to regular ones with updated quality
- By defining a path map a background is provided for continuous improvement of occupational function
- It grants opportunity to engineers to be empowered and to lead functions in the same path of strategies.
- It enjoys a regular structure and process for beginning and continuous development of training programs
- Based on the rapid scientific revolutions and technological development, team-work and professional activities are done.
- Identification abilities and responsiveness to changes highlight new opportunities and demolish any possible risks.
- It assists innovation logical improvement and quality of human force is improved in result.
- It unifies all policy makings and educational decisions.
- Organization transforms its inactive status to active and in progress.

Indeed, engineers who stand in innovative trainings’ cycle, are enable of recognition, solution of problems, moral commitment, experienced in implementation of experimental methods, obtaining high levels of knowledge in related technology, creative spirit and intellectual thinking, and preparing necessary background for implementation of research activities [8].

Suggestions
Regarding diversity of innovative programs, it is not possible to present a general prescription for its success; in this regard some suggestions are presented here:

- Focus on introducing creative programs;
- Trust to training priorities by establishing professional team works and scientific collaboration of engineers;
- Organic connection between research unit and training unit;
- Facilities should be provided for engineers to enjoy scientific advances;
Creating communication among different organization's sections based on knowledge-patterns;
Developing engineering trainings by the use of facilities and allocation of financial sources to it;
Access to information regarding technology and updated knowledge;
Attempting to increase activities related to science and data;
Attention to economic role of training and establishing positive relationship between scientific policies and industrial ones;
Increasing training budget in support of innovative programs[14];
Assisting productivity in software and hardware resources;
Revising payment system based on abilities and scientific professions;
Supervision on function of centers and professional institutes by individuals mastered in related knowledge;

In order to develop an innovative background, some suggestions are discussable such as: long-term perspective, defining directions for trainings, supporting innovative engineers and financial support of them to prevent failure of their training innovation, enrichment in professional trainings, granting more independency to training systems, information management across the organization and attention to innovation addresses related to trainings[16].

Although some of mentioned solutions are effective, it is not expected to solve all the problems and access the highest levels of training innovations. The point is that this issue should be studied rather than just training aspect. Any attempt in removing professional deficiencies is not possible just by improving training and job opportunities, providing scientific needs of engineers, and economic and political stability of organization. Psychological motivations should be provided for active participation of engineers. Motivation can be provided in various ways. Sense of effectiveness; promoting organizational attitude and playing role in organizational development, increase in occupational competition, and maintaining self-respect are among the most dominant ways of motivation seeking.

Conclusions

Industrial organizations attempts consistently to make difference competing. Achieving necessary capabilities for differentiation is actually intellectual application of knowledge based properties. Globalization of economics, customers’ excessive expectations, and competitive pressure and so on are symptoms satisfying improvement in the right path of innovation. This path is direct with a non-ambiguous end. The main subject matter of this paper was that the condition of vitality and stability of industrial organization was the rate of creativity of engineering trainings.

Although, this condition may not succeed without learning management and its achievement depends on proper understanding of innovation regarding empowering the organization for better function and experiencing diverse solutions in confronting competitive challenges; without them knowledge based organization is just a dream.

Common ideals in an organization, tendency to transformation in structures, lack of satisfaction regarding conventional management, customers with more expectations and increase in global markets’ competition are other issues proved their effects in reviewing innovation management processes in engineering trainings.

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