The Impact and Application of Nanotechnology on Human Resource Management

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Abstract

Nanotechnology is a modern science, and its applications are gradually appearing in different sciences. Though these applications are obvious in basic sciences, medicine, and engineering sciences, etc., it is difficult to explain the right usage of nanotechnology in abstract sciences as it depends on the foremost definition of discussing matter. One of the most prominent fields in which the definition of nanotechnology is most important is Management. This study tries to provide a point of view on definition and type of nanotechnology application in management. The purpose of this study is expanding, making more flexible, discovering various parts, levels, structures, and secrets of organizations and management knowledge by benchmarking from Nano science and surely, its findings show so many similarities between these which are visible and require thinking. Obviously, Nanotechnology would be effective in the development of different sciences and shall pose a challenge for human resource management in various parts such as adjustability of organizations, and as a result, accelerating the organizations' Nanotechnology development. Organizations must adopt these developments by using appropriate structural policies. In the present paper, I examine two points of view: The effect of Nanotechnology on human resource management ; and also the application of Nanotechnology in the HR department of organizations.

Keywords: **human resource management, nanotechnology, management**
JEL Classification : M12

The emergence of Nanotechnology shall have some deep ramifications on our world and society. By these changes, our personal lives shall be changed too, and this question is proposed that what effect this revolution has on our organizations? The progress of today's world, development of the virtual world (the Internet), and increasing communication between persons and nations creating social epidemics, establishing various social groups, all shows the effect of human relations in today's world and all current activities in it.

The experts of organizations have to have a correct perception of the basis and concept of Nanotechnology and its efficiencies. Compatibility and planning are always valuable points in commercial changes in today's world, and among these, managers of human resources and organizations shall have a distinguished role in the development and achievement of these goals. The managers as strategic partners are expected to play a more colorful role in changing the new nano knowledge integration process and applying this knowledge in business organizations. In fact, human resource management shall have a unique and challengeable role in this new era. The changes and capabilities of Nanotechnology, which are not known up to this date, shall be a challenge for human resource management and in the future, the HR Department shall be responsible for implementing all changes accompanying the implementation of nanotechnology in organizations or between business partners. These changes shall include new responsibilities in employment of experts and also planning for continuation of coordination, based upon the changes that will be brought about by nanotechnology.

Owing to its inherent characteristics, nanotechnology may play an important role in upgrading traditional industries by enabling new functionalities and adding value to existing products. Nanotechnology can also enable more radical innovation and thus the growth of new companies and industries, especially if it converges with other technology fields such as biotechnology and ICT (The Impact of Nanotechnology on Companies : Policy Insights from Case Studies, p.13).

Definition of Nanotechnology

Nanotechnology consists of two words; Nano and Technology. *Nano* is a Greek word, which means small, and a nanometer is one-thousandth of a micron or one billionth of a meter, or it is denoted as 10^{-9} of a meter. Nanotechnology

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is based on bottom-up (atom and molecule particles are the basic particles of the blocks) production (Mansoori, 2005). It is a technology that attempts to use subatomic objects measured in nanometers. It is an enabling technology that allows for both the improvement of existing products and also the development of completely new products and processes, sometimes new processes as well.

The Role of the HR Department

Managing the appointed roles for human resource management such as employing, selecting, appointing, training, developing, etc. has a direct impact on return of shareholder's capital and efficiency. Although successful companies attract and employ skilled staff, even human resource management should change in order to look at the necessity of replying to the changes, environmental predictions, and effective decisions for the future (Komoche, 1992) . It is now expected from a human resource unit to increase the value of an organization instead of adding overhead expenses to the organization. This point of view transforms a human resource unit into something more than just a monitoring unit for policy implementation and supervision of the employees. This unit should cooperate with the operational managers and undertake activities for reviewing and reforming the role of the human-resource unit (Salaman, Storey et al., 2005).

Challenges Faced by the HR Department

1) Universalizing
2) Profitability through development
3) Technology
4) Mental assets
5) Change, change, and more change

1) Universalizing : Managers are often faced with some challenges in creating a balance between universal requirements and acting locally. People, ideas, production and information should relocate in order to fulfill the local needs throughout the world. Currently, some unsteady political situations, issues of worldwide trading, variable transaction rates, and unfamiliar cultures have crept into commercial decisions. Therefore, managers should be trained to cater to the needs of their customers. They should develop their abilities in learning to cooperate with each other to manage variety, complexity, and ambiguity throughout the world. In this condition, the human resource managers have their special duties. Their duty is to make sure that the HR policies and activities pay attention to the balance between compatibility and coordination against recognition of cultural and other differences.

2) Development : Many of the western companies have achieved loads of profits and income through minimizing and decreasing the number of organizational levels and firmness. Currently, they consider increasing profits by development, which leads to issues and challenges for human resource managers (Becker and Gerhart, 1996). Therefore,

- HR Managers should encourage and train their employees to be innovative and creative. In other words, they should encourage the staff to acquire knowledge in various fields - one such field is of associative learning.
- The organizations, which select development through merging, consistency, or common investing, need the necessary skills required by human resources such as combining different cultures and working processes.

3) Technology : Organizations are expected to review and update their technologies. Technology is a special transfigure of change. Any change is difficult, and human resource units should consider themselves as change agents. Particularly in the case of technology, it is necessary for the organization to take action for decreasing the employees' resistance against new technology and make sure that supporting and training steps have been taken. In this manner, the staff is able to cope and adjust to new changes and developments.

4) Mental Assets : The most successful organizations are those, which attract, train, and retain individuals who are able to manage organizations across cultures. One of the features of such organizations is being sensitive to the clients' needs and to always be on a lookout for opportunities provided by technology. It is the responsibility of the human

resource unit to recruit suitable employees, train, and retain them. When the work force is suitable, it is necessary that the HR unit makes sure that the mental capacities of the employees are completely used. In addition, they should ensure that the results of these kinds of mental activities are completely clear, preserved, and properly distributed and managed.

5) Change : Perhaps, all the mentioned factors are the special expression of the most important of them, which is change. The human-resource unit should accept and support change. It means that the HR department of an organization should be flexible, sensitive, productive, and open to accept change. If the human resource unit does not change itself, it cannot change and support other sections of an organization. Accordingly, it is necessary to investigate and adopt new structures, work performance processes, and market support culture. Human resource managers should involve themselves in regulating reasonable, logical, exciting, and achievable objectives, which enable the companies to change themselves according to the available technologies. Generally, human resource management means understanding the importance of the human resources of an organization, which results in an organization's predominance in its field, attention to the customers, creating employment, and offering quality services/products to the customers.

In the present paper, I have discussed two points of view: Effect of nanotechnology on HR management and have also shed light on the application of nanotechnology in the HR department of organizations.

The Impact of Nanotechnology on Human Resource Management

❖ **Quick Changes in Employment Models :** While implementation of technological change requires industries, nanotechnology would be implementable in organizations which can adapt themselves to rapidly occurring changes. The organizations manufacturing "tools or machineries at a molecular level" would need the evolution of this knowledge gradually by employing people with specialized skills and education. This is because only people with specialized knowledge and skill sets will be able to facilitate the process of fully integrating the new science of nanotechnology into the fabric of business organizations. These changes include new responsibilities in attracting specialized manpower in the area of nanotechnology.

Nanotechnology shall change the method of manufacturing as well. It shall turn the employment composition and subsequently change the remuneration levels. Nanotechnology in the long-term shall lead to stable development and bring about a decrease in the general level of the prices. Absenteeism and turnover may be dramatically reduced because lengths of illness and injuries will be much shorter due the significant advances in medicine. Fewer invasive surgeries would be required, resulting in shorter periods of recuperation, enabling quicker returns to work. Employees may be able to work twice as long without the need for sleep, vacations, or other time off from work; workweeks may thereby be shortened. Hence, medical plans and other employee benefit plans and leave policies would have to be radically changed (Bogaert, 2004, pp. 4-5).

❖ **Change in Retirement Policies:** Retirement may be abolished in the future. Nowadays, re-employing retired individuals is popular in some of the countries due to non-availability of a new expert with required skills and experience (Schellenberg, Turcotte et al., 2005). Therefore, part time re-employment of the retirees will become common. Regarding the development of nanotechnology in the future, due to enhancement in the general health of the people due to major scientific breakthroughs that will come about due to nanotechnology, producing new drugs, treating many illnesses, which cannot be treated now, enriching foods for good health of people and similar issues, life expectancy and longevity of the manpower will increase. Hence, retirement may become an obsolete concept. Human resource management and employee benefit record keeping will continue to be more efficient and portable because of new advances in "information nanotechnology". "Paperless" HR departments will also become the norm; those organizations that do not make changes to upgrade their e-communication and e-record keeping systems will lose out to competitors. Labour as well as national social policies would also need to be updated (Bogaert, 2004, p.5).

❖ **The Impact of Nanotechnology on Various Dimensions of an Organization and on Human Resource Management:** While changes in nanotechnology can create new features in a material to solve the physical problems, remove deficiencies, and produce a perfect material with low cost and high efficiency, as a manager, we can

do something by changing the features of an organization or its structure, so that the each and every member of an organization can fulfill his duties in a better and more efficient manner, and can improve the processes and performance of an organization, resolve difficulties, and remove deficiencies in an organization. But how can we change the structure? And how can we create a new, specialized, and innovative structure? In fact, it should act like such a virtual organization, which would outsource expensive commonplace and administrative activities. Adaptability and planning are valuable strengths in a competitive business world. HRM will need to be prepared for these and other realistic possibilities that will transform the workplace. The employees, and most importantly, the HR department of an organization would require innovation and creativity in order to change the organization from a traditional one to an advanced and capable one. By extenuating the organization, most of the problems of the organization and expenses shall be solved.

At a time of increasing competition among the organizations due to the application of nanotechnology, only those organizations would be successful that are flexible and quick. However, we should not forget that managing these organizations would be a challenge because of extremely specialized employees (people with Ph.Ds in nanotechnology and related areas), flat structures, and little control over the working units (Lorenzi and Riley, 2000) . It would be a challenge for HR managers to retain such employees with such a unique and rare skill set, and workers with molecular manufacturing expertise would be in high demand (they might freelance for huge sums of money) or might be poached by rival organizations. Furthermore, people with generalized (ordinary) skill sets might not be employable in the future, as common tasks might be accomplished by robots developed by using nanotechnology. Such a step might raise unemployment levels, but can be cost effective for organizations.

❖ **Social Consequences :** Progress in the area of information is considered to be a kind of super power. As a result of using nanotechnology and its development, we will witness stiff competition in various fields. It is clear that with development of this technology and its impact on the social system, our expectations from life will change, and we will ask, “how will the old population be retained?” Most of the people will enjoy longevity (due to breakthrough developments in medicine, the use of "Nanobots", non-invasive surgeries, etc.) and the issues such as chaos, environmental pollution, and food crisis will come up (due to decrease in mortality rates). By developing an unlimited access to the available information, it is necessary to have a government, which would control and implement the regulations severely. In addition, the governments would need to make new regulations for fighting the propagation of unmoral procedures or the misuse of information (Lorenzi and Riley, 2000).

Conclusion

In the present paper, I have presented the effects of nanotechnology on HRM in three aspects: the first aspect is the required changes in an organization's structure - it would be required that the structure of an organization must be changed to a smaller structure, which would be more efficient based on nano philosophy, while also using some strategies such as outsourcing etc. The second aspect of these changes would be the recruitment of employees who are highly educated and possess the adequate skill sets required for working with such an advanced technology. The third aspect is that the HR department of organizations would have to be ready to fulfill the requirements of such a highly skilled workforce, empowering more jobs based on day technology and encountering some phenomena such as delay in retirement date resulting from the achievements in nanotechnology in societies and changing the life expectancy and employment pattern. The almost unlimited power associated with information nanotechnology will likely require strict governmental regulation and caution to minimum risks of unethical practices and unknown dangers to society.

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