



Technological Innovation for Mechanical Engineers Performance in Organisational Productivity

Sibete Godfrey Ayeabu¹, Worgu Fortune Osaruchi², Waratimi Emomotimi Obonika³.

¹Department of Mechanical Engineering, Niger Delta University, Wilberforce Island, Bayelsa state, Nigeria.

²Department of Mechanical Engineering, Rivers State University, Rivers States, Nigeria.

³Nimasa Science and Technical College, Delta State, Nigeria.

ABSTRACT:

Technological innovation is critical to mechanical engineers performance in organization productivity. The paper discusses the real process of both technology and innovation that are the players of technological innovation, procedures for technological innovation and the relationship between mechanical engineers and technological innovation. It also highlights the factors which will determine innovativeness and the generation of innovation idea as well as the sources of innovation. Secondary data and content analysis was employed to explain and analyze the indices of the study. The study therefore concluded that technological innovations are indispensable to organizational productivity as new ideas and methods are equally devised by mechanical engineer in these modern days with findings that technological innovations are major means of increasing organizational productivity and host of others.

Keywords: Technology, innovation, technological innovation, mechanical engineers, organizational productivity.

INTRODUCTION

Developing countries like Nigeria and others have long been dependent on foreign sources of technology (Abernathy et al, 1978). For most of these countries, the pattern of dependency began in the colonial period and reinforced by the pursuit of imported technology in the post- colonial period.

Over the year, developing countries to the extent that our people lost their ability to produce goods for exports but paid little attention to local production technology because of their proficiency at importing goods and services from all parts of the world. During the period (from 1986 -1994) Nigerians lost the will power to apply our minds to technological creativity and innovation, to devising new productive processes and engaging in local production of export goods and services. Today, Nigeria has continued to depend not only on foreign technology but also on imported raw material for her industrial activities.

Moreover, indigenous technological innovation has been rather elusive all these years and so science and technology have remained fundamentally a consumption item in Nigeria rather than an investment item. Hence, the impact of technological innovation has not been on the economic development of the country

In this paper, we shall discuss on the process of technology, players in technological innovation procedures for technological innovation, the process of innovation, factors that determine innovativeness etc

CONCEPTUAL CLARIFICATION

A conceptual discourse be made on the process of technology, relationship and differences between science and technology, players and procedure of technological innovation, the process of innovation and its types and that of the factors which will determine innovativeness.

i. The process of technology:

Technology simply means the scientific knowledge application to solve man's problem. It can be also known as the application of processed inputs as output.

The process of technology has many sides and is thus complex to epitomize. One of the best models of technology process was produced some years ago by the schools Councils Project Technology Team.

The process of technology has some considerations worth stressing as:

- ❖ It gives a useful working definition of technology, it is the disciplined process of using scientific, material and human resources to

achieve human purpose. Other definitions which have been used in the literature include:

- ❖ The art of directing the great sources of power in nature for the use and convenience of man.
 - ❖ Getting more out of less
 - ❖ The purpose of technology is to create through a disciplined process of optimization.
 - ❖ Technology is a word created by the non- technical to describe what the other people are about. It is created by an attitude of mind both on the part of those who look at in fear and disgust and also to those who look at it in wonder and awe.
- ii. The process works within many constraint (e.g the law of science), there would be little point in trying to design an internal combustion engine with an efficiency of more than 100 percent (or even in practice, anything approaching 100 percent) or a conventional rocket which could travel faster than light. other important constraints include social , financial and technical constraints (e.g the existence of suitable materials).Concord’s problems were largely technical (and financial rather than scientific , there was nothing in concord’s design which was not perfectly in accordance with existing scientific knowledge.
- iii. The process has many resources at its disposal including that of personal creativity, a point which is often not fully appreciated. Its absence in industrial life is often quoted as a reason why some student are not drawn towards careers in manufacturing. But its absence is more apparent than real. Good design demands creativity; Infact a whole range of different abilities is required in a manufacturing company if the company’s product is to sell.

Unless inputs to the technology process are available from across the range of talents, the product is likely to be deficient in some important respect. For example, a car of outstanding good looks would be unlikely to sell if it were mechanically unsound. It would also be unlikely to sell well if its appearance was generally considered to be unattractive, even though in all other respects it was made to very high standard. Technology is the disciplined process of using scientific, material and human resources to achieve human purpose.

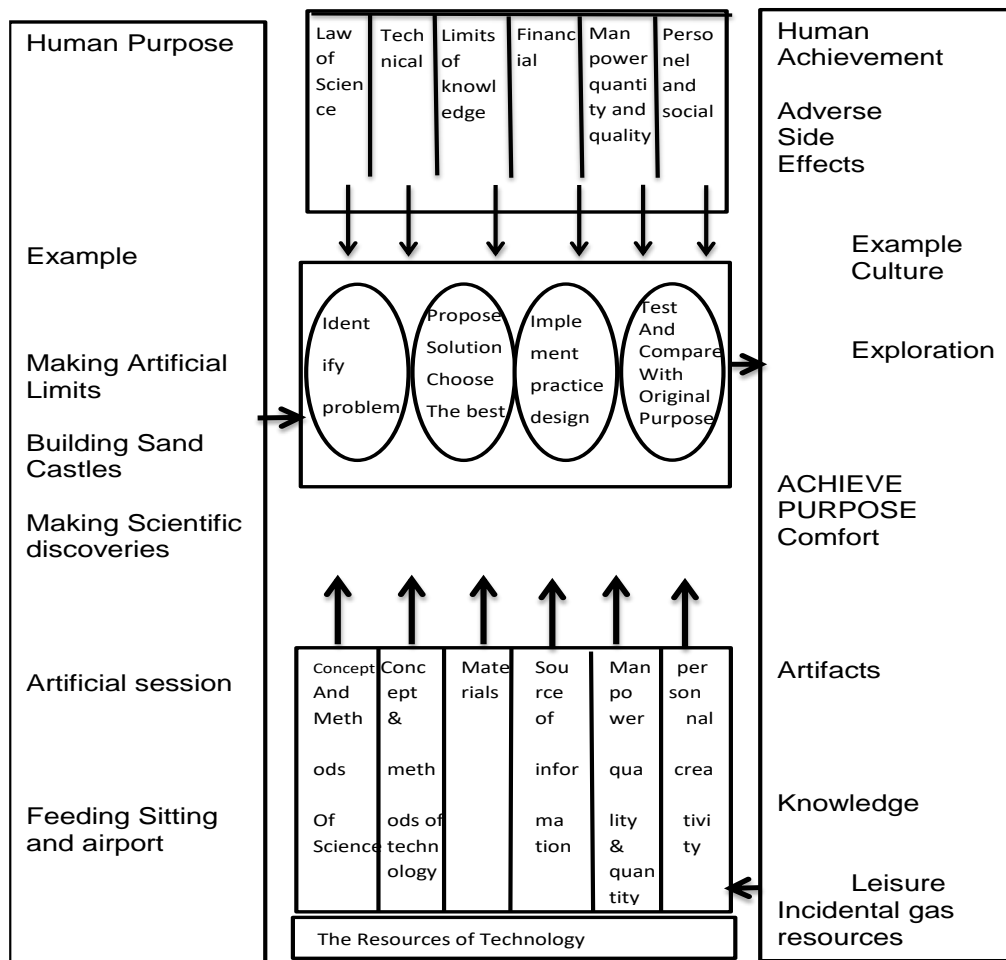


Figure 1: Process of Technology

Figure 1: Process of Technology

iv. PLAYERS OF TECHNOLOGICAL INNOVATION

Technological innovation is the ability of individuals with scientific knowledge to create new products / process, system or device. This process, systems or device will produce new products and services to solve man's problems. The one who possesses technological innovation include the following:

- ❖ Creative thinker with power and quality to produce new ideas.
- ❖ An innovator who brings in or induces something new to the organization or society.
- ❖ Engineer like entrepreneur receives ideas and turns them into business realities, it is reflected in psychology
- ❖ Champion who picks up an idea and runs with it. One who act as a catalysts in breaking resistance to change and/or persuade management to develop and attempt to market new product and more efficient processing methods.
- ❖ Sponsor who gives idea backing it deserves.

Creative thinking is a function of the brain, which is capable of analyzing, synthesizing and valuing. See the sequence of related steps of technological innovation process below.

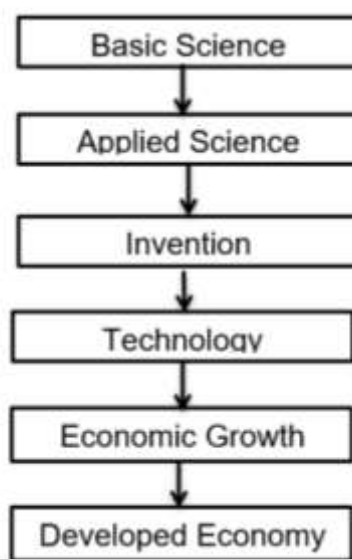


Figure 2: Sequence of related steps in technological innovation process

PROCEDURES FOR TECHNOLOGICAL INNOVATION

The basic procedures for technological innovation include the following phases:

Removing invisible frameworks around problems. This involves challenging assumptions, widening your span of relevance, freedom from fixed ideas and defining problems correctly.

Welcoming chance intrusions. Seeing chance as the investor's luck and having the ability to remain alert and sensitive for the unexpected. In the field of observation, chance favours only the prepared mind.

Listening to your depth inner mind (i.e spirit man). This encourages the creative process, preparation (groundwork), incubation. (Mental work), illumination and verification (through testing). It also removes mental block and lack of starting point; perspective, motivation and consultation.

Suspending Judgment. Do not criticize your own ideas prematurely but beware of quick fire critics and choose constructive critics.

Using the stepping stones or analyzing. Analyzing is the inference that if two or more things agree with one another in some respects, they probably agree in others.

Tolerating ambiguity and apparent failure. The worst enemy of creative thinking in problem solving is a low tolerance for ambiguity.

Ideas banking: take a strategic/long term approach to stocking on equipping your mind to work. This includes:

Curiosity - Desire to learn and know.

Observation - looking/ listening/ touching/ tasting/smelling.

Listening -	listening requires more intelligence than speaking.
Reading -	Reading is to the mind what exercise is to the body.
Travelling -	Travelling stimulates your creative powers.
Recording -	The act of writing impresses the words more deeply on the mind.

THE PROCESS OF INNOVATION

Innovation has been a subject of fascination for centuries. At the end of the 1500s, Sir Francis Bacon as quoted by Hindle (2008) wrote that "he that will not apply new remedies must expect new evils, for time is the greatest innovator" in the first place, invention is the ability of individual to discover, or to exploit a new way for the utilization of a device, product, process e.t.c. It is the creation of an idea and the test of such an idea using a typically hand built model, in order to prove the principle involved. Every invention is an innovation but not all innovations are inventions.

Innovation is quite different from invention. Invention according to Freeman (et al (1982) is an idea, a sketch or model for a new improved device, product or process or system. It is a technological achievement that has not been exploited commercially.

Whereas innovation is the creative ability where the emphasis is more on the implementation of a creative thought or idea. It is apparently never ending process which starts with the identification of an opportunity or a need to be met or problem to be solved. Amidon (2002) describes innovation as the creation, evolution, exchange and application of new ideas into marketable decision making, provides feedback, negotiation, self-esteem and risk management. It is a decisive operation carried out with a view to installing a given change to be accepted and used.

MECHANICAL ENGINEERS AND TECHNOLOGICAL INNOVATION

Mechanical engineers are critical thinkers as well as technological innovators who involves deeply in the optimistic model science and technology experiences and tend to be concerned with production of new machines out of innovative ideas.

The mechanical engineers also engage in the process of technological development by bringing up new methods that work, which leads to new technological innovation as a quick solution to man's environment.

Mechanical engineers again made discoveries of processes which are new to solve particular problems in the society of modern times.

Basic researches are also carried out by mechanical engineers to design machines that give power and energy as to be used by industries for fast production of goods. This is a result of the technological innovation.

Mechanical engineers are great inventors and technological innovators who develop and build a wide range of machines, including automobiles as well as new industrial processing equipment out of technological innovation.

FACTORS WHICH WILL DETERMINE INNOVATIVENESS.

The degree of success as a creative and innovative operation depends on a number of factors. These include:

The quality of the people employed by the firm and their aptitude for such activity both at management and employee level.

The environment within the firm, whether or not it is conducive to such activity and attractive to such people who demonstrate a potential for it.

The imaginative and efficient application of the process of innovation in developing the new idea.

The firm's record for innovative output as reflected in the quantity and quality of ideas generated by its creative people.

The effectiveness of screening the ideas for adoption and commercial exploitation, the firm's success rate in picking winners.

The Generation of Innovation idea.

The first definition that comes to mind for an innovative idea must be the identification and development of new product ideas. According to available literature, the generation of innovation ideas is equally critical where;

A new method of production is needed to improve efficiency or a new source of raw materials is required to increase competitiveness.

New sources of capital need to be identified.

A new structure is required to be introduced into the organization to give improved opportunity to talented people or to enhance the systems of communications in existence throughout the organization.

New types of skilled labour need to be identified and introduced into the organization alongside the introduction of new, perhaps more complex technology.

Indeed, the generation of innovative ideas are critical in all areas of activity in the organization where problems exist and innovative solutions are required to resolve them.

SOURCES OF TECHNOLOGICAL INNOVATION

Technological innovation is a switch from existing technologies to others that are new- new to those users, regardless of whether they are also new to their other users. The new technologies will economize on input, afterwards outputs may be produced with the same amount of inputs. Thus technological innovation will have made it possible to increase production.

Below are the sources of technological innovation;

Incremental Innovation:

Most technological change is incremental, that is, each innovation constitutes a relatively small step built on the base of established practice. Although each step is small, the cumulative economic consequences of incremental change are large. In a variety of industries, leading firms have prospered for extended periods by successfully exploiting a series of incremental technological innovations built on their established organizational and technological capabilities.

Radical innovation:

One of the stylized fact prominent in the literature of the technological innovation is that radically new technologies are often pioneered by firms new to the industries that they ultimately transform.

The conventional wisdom holds that the attacker has the advantages in this cases, that is, that even powerful incumbents in established industries are at a disadvantage when new technology emerges. The “attackers” advantage is typically seen as deriving from the incumbents disadvantage. Such disadvantages include the inherent conservatism of being financial firms towards new technology administrative processes, management myopia and bureaucratic rigidities.

The economic and organization theorist seem to agree that established firms are likely to dominate incremental innovation while entrants are likely to dominate radical innovation. The implications of this conclusion obviously depend on how one identifies a “radical” innovation. To the economists, a new technology is radical if it leads to products that dominate and make obsolete the previous products in established markets. The organizational theorists see innovators as radical and favour new entrants at the expense of entrenched defenders. In other usage, innovations are considered “radical” when they draw on new or different science bases or more generally when they require the development of qualitatively new technological capabilities within the innovating organization.

Methods and Materials

A content analysis and secondary data were employed as methods for generating relevant information and analyzing the contents of each sub-heading of the study. Both the technology and innovation process were clearly indicated with clear diagrams to buttress the whole technological innovation.

Discussion of Finding/Results

From the discussion so far, technological innovations are essential ingredients for economic growth and development, they are the major means of increasing organizational productivity.

The finding also revealed that technological innovation brings about new products/new services to an existing and new market.

Conclusion and recommendations

Technological innovations are indispensable to organizational productivity as new ideas and new methods of applying them into an existing organization to become unique in its operation. The advent of technological innovations broke the recessionary circles in the business world, enhances international competitiveness, reduces cost of production, results to efficiency and effective growth of organisations, having an edge over competitors and attract more customers, establishes new model and product differentiation etc.

In order to advance technological innovations for organizational productivity, then the following recommendations are proffered solutions including; there is an urgent need for re-orienting towards positive technological innovation in Nigerian industries, mechanical engineers in such companies and industries avail much time into technological innovations for expected organizational productivity, even the government of the country and management of various companies/industries should encourage funding of technological innovation models/strategies as well as sponsor all engineering or technical officers for technological innovation trainings. Encourage other employees to demonstrate an aptitude for innovative activity.

REFERENCES

- Abernathy; W.J & Utter back, J.H (1978) Patterns of Innovation in Technology Review, 40-47,80
- Amidonn; D.M (2001) Innovation:What every CEO should know Christensen, C.M and Rosenbloom, R.S (1999) Explaining the Attacker's Advantage: Technological Paradigms, Organisational Dynamics and the Value Network, Research Policy.
- Cobelli, D.T and Rudeluis, W (1987) Managing Innovation: Lessons from the Cordia-Pacing Industry in E.B.Roberts (ed), Generating Technological Innovation, Oxford University Press, New York.
- Dosi, G (1982) Technological Paradigms and Technological Trajectories, Research,sPolicy, II.
- Foster, R.N (1986) Innovation: The attackers' Advantage, Summit Books, New York.
- Freeman; C (1982) The Economics of Industrial Innovation (2nded) MIT Press, Cambridge, M.A.
- Hindle, T (2008) Guide to Management ideas and gurus.London, Profile Books Ltd.
- Qaikhinan, E.P (2000) Technology Acquisition and Management Ekpoma: Inno Prrinters (Nig) Ltd.