

The Internet as a Catalyst for Decision Making in Manufacturing Industry (A Review Article)

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Abstract: The decision on what to produce, how to produce, when to produce and at which cost to produce is fundamental and critical to the success and survival of any manufacturing industry. The decision making process hitherto the evolution of information technology was complex. The complexity could be seen from difficulties and financial burden associated with data gathering, analysis, communication and manpower hours. The evolution of global connectivity is indeed a remarkable technological breakthrough that has contributed immensely to shorten the longevity of time, human and material resources and procedures associated with decision-making. This has propelled most organizations to brace up and refocuses their attention to embrace information technology as a catalytic tool in decision-making process. This paper takes a critical view of Internet as an effective tool in the decision making process and lays bare its various facilities and their imperativeness in taking decisions in the manufacturing industry.

Key words: Manufacturing industry, decision making, Internet, intranet, extranet, hardware, software

INTRODUCTION

The role of information and communication technology in the present day society is so pervasive that one may consider it almost indispensable in our daily activities and in the modern day business world. In the present day business environment, it is obviously difficult to embark on any business transaction without information. Exchange of information; be it in the form of sound, video or text is an essential ingredient and a prerequisite for sustaining all business transactions. Consequently, in a business environment that is wholly dependant on information; all forms of automation are essential and imperative. The society is gradually coming to face the reality that we are living in an industrial era where the efficiency of the four factors of production: land, labour, capital and entrepreneur to achieve organizational goals, aims and mission and create the anticipated wealth depends to a large extent on various kinds of automation we embrace and employ in our activities. Issues relating to latest technology in the manufacturing equipment, materials, process, evaluation of information on competitors, sales forecast and projection, pricing methodologies, strategies for profit maximization, market penetration and exposure are of paramount importance and considerable interest to the management and particularly significant for the growth and survival of any manufacturing industry. The innovations in Information and Communication

Technology in the area of distributed systems and networks coupled with advances in software development have placed the computer systems of today into a position to play a far greater role in and outside the manufacturing industry to tackle these issues. One of the ways in which Information and Communication Technology is being deployed in the manufacturing industry is Internet. Internet simply put is the global inter connection of computers. The major objective of this interconnectivity of computers is to share resources (Akinyokun, 1999). Computer networks and computer communication have grown rapidly from academics and commercial precincts to application in the industries. The reason for this is not far fetched and can be traced to the followings

- continuing decrease in cost of acquiring computer
- increase in capability of computer hardware.
- user friendly software.
- the need to align with modern trends of doing things
- availability of Internet Service providers and cyber cafes virtually everywhere

With these reasons, there is the strong desire to embrace the in-thing i.e. to either inter connect all these computers within a particular manufacturing industry or use the nearby cyber cafe for the purpose of applying its facilities to the running of the industry by and large and for taking decisions in particular.

RESULTS AND DISCUSSION

There are many manufacturing companies located in Akure, the capital city of Ondo state in Nigeria. The methods and mode of information gathering, analysis and dissemination in the course of decision making in these companies were closely studied. It was discovered that decision making process involved more of manual system and less off electronic method. Consequently, the delays, cost, credibility and reliability of decision process and decision made will be improved upon if the following components of Internet are incorporated in the process.

Extranet, internet and intranet: The general forms of computer interconnection can be classified into Intranet and Internet. Before going into the details of the two forms, we need to distinguish between Extranet and Internet

Extranet: An Extranet is a refined out growth of Internet. In its most basic form, an Extranet is purely a password-protected Internet site. The simplest Extranets have a single password allowing access to a greater range of information than would be available on the open Internet site. This may be a good route to follow to prevent casual visitors from having access to clients' information.

More complex Extranets have client's specific areas. Extranets operate securely, using password protection to give clients access only to those areas to which they are allowed to have access. Clients have a user name and password that allows access to information that is made available to them alone. Thus Extranet technology enables information and applications to be shared both internally and externally because access can be controlled on the variety of parameters.

Internet: It is pertinent to repeat here again that Internet is a global inter-connection of computers. Presently, Internet is the number one vehicle that moves commerce, banking, communication, manpower development, research, capacity building, design, etc. to our desired level i.e. organizational anticipated level. It is within this veracity that we talk about leapfrogging. When harnessing tools and technological breakthrough in information and communication technology for the purpose of conveying instead of conserving cutting edge information and knowledge that are imperative for rapid development over the Internet for mass consumption by a wide spectrum of the population; this is the explosion that now becomes the round peg in the round hole of the organizational growth.

Internet, which is the inter-connection of millions of computers in the world through diverse portal, (be it terrestrial or satellite) evolved through the Advanced Research Project Agency Network (ARPANET)) of the US Military after the launch of the Sputnik by the then

Soviet Union. While its usage was prevalent then among Scientists, the military establishments and exclusive universities as means of exchanging crucial research and strategic information, its development to its present level surged in the 1990s providing quick and easy access to diverse information and databases across geographic location and natural boundaries. It is mandatory to say at this point that Internet has become a vehicle that has drastically reduced the longevity of decision making process, its cost, complexity, human and material resources while at the same time has increased the efficiency and effectiveness of decisions made in manufacturing industry.

Components of internet: Having described Internet as a means of leapfrogging, it becomes pertinent to bring out the underlying components that make up Internet. The components can be grouped into hardware and software.

Hardware: The following are the basic hardware components of Internet:

- Computers
- Data transmission facilities like modems, multiplexer, and telephones for it to be operational and effective. Some modems are acoustically coupled with the telephone lines, via a telephone handset transducer to facilitating smooth connection with the server (a dedicated computer) for proper logging on the network.
- Auxiliary resources like printers, scanners, plotters etc.

Software:

- **TCP/IP SOFTWARE** This software is to enable the computer to talk on the net. In windows the core of the TCP/IP software is called the Winsock or Window socket. It should be noted that this software is inbuilt in some operating systems. Therefore it need not be installed again if any such operating system is being run.
- Operating system, utility and application packages.
- Web browser e.g., Microsoft Internet Explorer and Netscape.

The operating system can be any of the followings Windows95/98/NT/2000 or Macintosh.

After the procurement and appropriate installation of these components, then an Internet Service Provider is selected to interconnect the computers with other computers of the world for sharing and exchange of information and knowledge.

Intranet: The mechanism that passes information between computers on the Internet can be used exactly the same way over a local network such as in an office or

within an organization. When this is not publicly accessible, it is called an Intranet. The term Intranet is somewhat misleading conceptually, because it invites a contrast to the term Internet. The real contrast is with the World Wide Web (WWW) - an important distinction, because Internet focuses on physical and technical networks while the web focuses on the set of content accessible on that physical and technical infrastructure.

The term Intra Net was coined at Amdahl Corporation in the summer of 1994 (Kennedy 2001); it did have the connotation of the internal web rather than internal Internet. In fact, the term used previously was too cumbersome "Enterprise- Wide Web. So, while the ambiguity of Intranet was apparent even back then, for lack of a better alternative, it caught on.

Intranet was defined in the early days as "an infrastructure based on Internet standards and technologies that support sharing of content within a limited and well- defined group". The infrastructure referred to the organizational and management infrastructure that created managed and shared the content.

It could be seen here that this definition encompass what is called extranet today because the defining factor is a "limited and well-defined group," and does not specified any official organizational affiliation. The web, in contrast, is an unlimited group. Today, Intranet, Extranet and the web are seen as collections of content for organizational growth. An Intranet is a set of content shared by a well-defined group within a single organization. So, in a simple clear term, Intranets are designed to give a group of trusted Employees access to a set of resources within the industry.

Internet tools and facilities: There are some facilities in the Internet that facilitate, sustain and promote exchange of information. The tools and facilities stated hereafter are some of the tools stated by Manning (2000) and Kennedy (2001):

Portal: A portal is essentially a gateway, and in the e-business world, it is a website that serves as a starting point to access a variety of information and resources. Internet portals like yahoo and excite pioneered and popularized the term, and manufacturing industry can apply the concept to their own Intranets and Extranets as a means of simplifying access to valuable resources on a network.

Virtual private network (VPN): A Virtual Private Network or VPN uses the Internet as the backbone for remote access and trusted LAN-to-LAN connecting. It is effective for securing traffic between two perimeters .In a manufacturing industry, VPN will work well for connecting branch offices for effective branch-headquarter relationship.

Discussion lists: Discussion lists and newsgroups are virtual forums for exchange of ideas and information. Discussion lists rely on a virtual address that acts as an interface between list participants. Every participant sends messages to this address; the messages are then stored and forwarded to all the recipients. Manufacturing industry can maintain a list for members to subscribe for effective information dissemination and coordination of the industry. The industry can also create their internal discussion list account.

Internet facsimile (IFAX): Another major landmark in the Information Technology world is the Internet Facsimile (I fax). This development makes it possible for a fax messages to be sent on the Internet. Also there is a facility which can convert fax message to attachment to a mail and downloaded from the computer. This technology is a development over the older fax technology, which had been in existence for sometime. The economic impact of I fax is reduction in the cost of sending messages.

Internet telephone: Internet Telephone is another breakthrough in this information age. This facility makes telephone communication between two people possible.

Voice mailing: Voice mailing is a new technology, which allows a mail to be sent on the Internet by the sender simply using a keyboard that is voice-sensitive with the aid of a headset and microphone. The sender would only dictate the mail via the keyboard using headset and microphone and the message is automatically transferred to the Random Access Memory (RAM); the content of which is displayed on the Visual Display Unit (VDU) and consequently sent the message through the Internet.

Internet chatting: Chatting facility on the Internet allows chatting between two or more people irrespective of their geographical location. It is possible to chat with people in other continents with ease for as long as one desires with this tool.

Electronic mail (E-mail): Electronic mail is an Internet tool that is widely used as an alternative to the postal system to exchange letters, ideas and co-ordinate joint projects. Presently, e-mail has grown in popularity to such an extent that a reasonable proportion of world population now uses it as a means of communication. Email is such an improvement on the postal system that has revolutionizes the way we communicate. It is possible through Email to send a message to someone or organization with an email address anywhere in the world and for the message to be delivered at its destination within some seconds. The only requirement for using this facility on the net is for both the sender and the receiver to have an email address.

G-mail: GSM Mobile phone from Motorola is Internet friendly. It can enable the user to surf the web, send e-mails and faxes and is WAP (Wireless Application Protocol) enabled.

G-mail is simply a GSM technology that permits mail to be sent or received using the GSM wireless network.

World wide web (www): World Wide Web has emerged as a viable and legitimate way to publish information. Certain kinds of information can be found more effectively on the web than it can be found using prints sources. The web also serves as advertisement medium where millions of people can be reached worldwide. This is an innovation that allows the manufacturing industry to expose their activities to the world while at the same time gather necessary information that will assist the industry to take decision on what to produce, how to produce, whom to produce and which cost to produce.

Application: The process of decision making in any organization is a long, tedious, time and resource consuming system. The various stages of decision making are as contained in (Buffa 1986). The complexity of this process has made most organizations to incur additional expenses by creating a separate department for such purpose. However, the longevity and costs associated with the process can be reduced considerably if the application of Internet is embraced. By and large, the key word that is central to decision making is DATA. Data is a raw fact about a given process that has a precise meaning and that is needed to be processed into meaningful information. Data are required to be gathered, analyzed, manipulated, exchanged and communicated in the process of decision making. (Akomolafe and Eludire (2008) identified three ways by which data can be processed and these are manual, mechanical and automatic/electronic system and also showed the relationships that exist between data and information and data usage. The manual and mechanical methods are associated with heavy cost of processing, low efficiency, inconsistency, lack of integrity and long period of time in its processing. This is the basic reasons why most organizations incur heavy bills in their decision making process. However, efficiency, timeliness, consistency and integrity are associated with electronic or automatic method under which we have Internet.

Most decisions that are made in manufacturing industries centers on what to produce, how to produce, when to produce and how clients demand can be met. All these can be broken into the following:

- The selection and design of a particular product
- Capacity planning decisions
- A supply, storage and logistics system.
- Competitive cost elements
- Production technology
- Personnel recruitment

There is no way quality decision and strategic plans can be made on any of these without gathering and processing data into information and further disseminating it appropriately without adopting a method of data processing. Therefore, the quality (in terms of cost, effectiveness, efficiency, timeliness) of decision made varies according to data usage and the equipment used in processing the data to get information which is subsequently used to measure achievement.

These can be represented thus:

$$GA \propto (RDU + RDPE)$$

$$GA \propto R(DU + DPE)$$

$$GA = KR(DU+DPE)$$

where,

DA = Decision attainment

R = Reliability

DU = Data Usage

DPE = Data Processing Equipment

K = Constant

Consequently, data that can ensure effective and pragmatic decision(s) on the major areas of decision in manufacturing industry can be got on the Internet by making use of the tools and facilities earlier enunciated. This will definitely reduce the time and cost associated with decision making if compared with the manual and mechanical methods that most organizations are using. For example a manufacturing industry in Kaduna, Nigeria can seek important information from another industry in Dubai by simply connecting to the website of the industry. Another example is the MD of a Nigeria based manufacturing industry who is to attend a conference in the U.S.A. He would only need to connect himself to the Website where the event is taking place and make his contribution(s), to the gathering where and when the need arises.

Internet is a key enabler in the creation of networks and thus allows those with access to the network benefit from exponentially increasing returns derivable from it. It is now possible to do virtually everything through the interconnection of computers and communication facilities. This unique feature is largely imperious to geographic boundaries and it allows remote communications to become integrated into global networks and thus extending all benefits derivable from the network to them.

Furthermore, manufacturing industries has the benefit to store, retrieve, sort, filter, distribute and share information relating to their activities through the Internet. This will consequently leads to substantial efficiency gains in production, distribution, markets, alignments and harmonization without expending much on decisions relating to such. Internet can also assist them to streamline

supply and production chains and makes many businesses processes and transactions learner and more effective. This invariably leads to develop a global partnership for development which may be clumsy, time consuming decision to make without the Internet. Also the emergence of Internet is capable to reduce to a minimal and tolerant level the idea of intermediaries. It is now possible to acquire services and products directly from providers and manufacturers irrespective of their locations without passing through any intermediary rather than for the industry to incur huge expenditure on decisions on intermediaries and sales

Problems associated with internet: Numerous problems are associated with the use of Internet which if not carefully considered prior to the setting up of the system may make an organization regret ever embracing it. However the problems can always be solved by consulting experts and through inbuilt mechanisms. Pertinent among them are

Security: If appropriate security measures are not put in place, most of the information exchanged through the Internet are not safe and secured. They can be assessed by unauthorized people. This can lead to so many negative consequences like falling victims of hackers, 419, spams, and yahoo yahoo boys. However, these can be prevented by deploying adequate security measures.

Viruses: Just as we have viruses infecting human beings so also we have viruses infecting computers. Computer virus is a program segment that can attach itself to another program, reproduce itself and spread itself from one program to another. Viruses which are very destructive are capable of changing data, sabotaging computer system and make it to malfunction.

Worms: Worms like viruses are designed to spread. But rather than wait for human being to transfer the infected file, disk or program they actively replicate themselves

over a network such as the Internet. For example, they might send themselves to all the contacts in an email address book. Worms can spread faster than viruses.

CONCLUSION

Despite the seeming increase in Internet Service Provider, availability of cyber cafe and liberalization of communication system, the services derivable from Internet are yet to be fully embraced by organizations generally and the manufacturing sector in particular. It has been shown that Internet have inbuilt tools and facilities that can be used by organizations to reduce the cost, time and inconsistencies in the decision making process. Also, it was shown that the innovations that each organization desire is dependent on data and its method of processing. Sequel to this, Internet is a reliable ally that can provide the necessary data and information required by organizations in areas of decision making, policy formulation and implementation, information simplicity and cost reduction.

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