A study of the important factors for upgradation or adoption of new technology

Technology, Information Technology

A Study of the Important Factors for Upgradation or Adoption of New Technology Kanza Bushra Roll No. MB-09-21 Session 2009-2010 Supervisor: Liaqat Javed Institute of Management Sciences Bahauddin Zakariya University Multan 2010 Institute of Management Sciences, Bahauddin Zakariya University, Multan ATTESTATION OF AUTHORSHIP I, Kanza Bushra Roll No. MB2-09-21 Registration No. 2005-bzba-158 A student of IMS MBA (II) Program in B. Z. University, solemnly declare that my Project Report entitled A Study of the Important Factors for Upgradation or Adoption of New Technology Is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person. This report is not submitted already and shall not be submitted in future for obtaining a degree from same or another University or Institution. If it is found to be copied/plagiarized at later stage of any student enrolled in the same or any other university, I shall be liable to face legal action before Unfair Mean committee (UMC), as per BZU/HEC Rules and Regulations, and I understand that if I am found guilty, my degree will be cancelled. Signature Name: Kanza Bushra Program: MBA (II) CERTIFICATE The project report entitled “ A Study of the Important Factors for Upgradation or Adoption of New Technology", at IMS-BZU MBA (II) / MS conducted by Kanza Bushra Roll No. MB2-09-21 Registration no. 2005-bzba-158 Session 2009-2010 has been completed under my guidance and I am satisfied with the quality of student’s research work. Supervisor _____ Name Liaqat Javed Date: _____ ABSTRACT This research is about the identifying the factors that drives the manufacturing organizations in Pakistan towards technology upgradation. There are many factors that

involve or influence the organizations in their technology upgradation or adoption decisions. Those factors are of organizational factors, production factors, cost factors and IT factors. First we have given the brief introduction of the topic that contains all the background and definition of the factors, their history and then identified the problem statement. After that we mentioned all research work that already had been done by different researchers. That literature helps to define the area of our problem and provide secondary data for or research. After that we defined the method, resources and whole design of the research by which we conducted this research. In the next phase we analyzed all the data, applied tests for hypotheses and explained all the results that come from this research and interpreted those results. The last phase is of findings and conclusion of the research, in which I explained the outcomes of the research and identified the factors that involved in technology upgradation or adoption process. The last part of the report findings explains the factors and give the findings about accepted or rejected hypotheses. ACKNOWLEDGEMENT First of all, I would like to say Alhamdulillah, for giving me the strength and health to do this project work until it done. Then special thank goes to my helpful supervisor, Mr. Liaqat Javed. The supervision and support that he gave truly help the progression and smoothness of this thesis. The co-operation is much indeed appreciated. Not forgotten to my family for providing support and everything to complete this project and their advice, which is the most needed for this project. Last but not least, my friends who were doing this project with me and sharing our ideas. They were helpful that when we combined and discussed together, we had this task done. DEDICATION

Dedicated to all those who helped me and encouraged me even with single word, and to those, without whom I m nothing. Contents CHAPTER 1 INTRODUCTION 1. 1 BACKGROUND: Technology itself is the upgradation or change. Technology is not static in its original sense. Technology in its definition is not only the name of machines and tools. Its definition is very broad. If we o for definition many researches definition the technologies in

different ways. As technology is the process by which modify the nature to fulfill our needs; Technology is more than tangible things like computers, software and aircrafts. In its dictionary meanings “ technology is a practice of applied sciences of commercial values". Technology includes the entire infrastructure necessary for the design, manufacturing operation and repair. Some researchers say that technology is a complete set of knowledge of about how to produce economy at the point of time including techniques of production or the set of production functions in an economy. Technology is the set of tools both hardware (physical) and software (algorithm, philosophical and procedures) that help us act and think better. Technology includes all objects from basic pencil and paper to the latest gadget. Technology significantly affect human to control its environment. Technology is the usage and knowledge of tools, techniques, and crafts or systems or method of organization. Technology has an impact on the society and its surroundings in a number of ways. Technology has helped to develop more advanced technologies. Various implementations of technology influence the values of a society and new technology often raises new ethical questions. Examples include the raise of the nations of efficiency in terms of human productivity a term originally applied only to machines and the challenges of traditional norms. 1. 2 HISTORY: It looks funny to think about when technology and its upgradation start. Infect when the human came into being or when the life started, the technology also started. Like from the Stone Age 2. 5 million BC, when human starts to live and survive he made tools to help, equipment to make life easy and weapons to protect themselves. And from that time technology is developing and upgrading and

with the ever passing time it is changing. Human are upgrading technology and adopting new technology according to his requirements. And that development, change, improvement and adoption has some factors or reasons, behind them. The use of the term technology has changed significantly over the last 200 years. Before the 20th century, the term was uncommon in English and usually referred to the description or study of the useful arts. The term was usually connected to the technical education. The meaning of the technology changed in the early 20th century when American social scientists beginning with thorstein Veblon, translated ideas from the German concept of “ technik" into “ technology". In German and other European languages, a distinction exists between “ technik" and “ technologies"; that is not present in English and both terms are usually translated as technology. By the 1930’s technology referred not to the “ study of industrial art" but the “ industrial art" itself. In 1937 the American sociologist Read Brain wrote that “ technology includes all tools, machines, utensils, weapons, instruments, housing, clothing, communication and transporting devices and the skills by which we produce and use them". Technology also refers to the collection of techniques. In the current state of knowledge and information is how to combine resources to produce desired products, to solve problems, fulfill needs or satisfy wants; it includes technical methods, skills, processes, techniques, tools and raw materials. And “ state of art technology" refers to the high technology available in any filed. 1. 3 TECHNOLOGY UPGRADATION: From when the technology started, the development or upgradation and adoption of the new technology also started. Every passing day making the existing technology obsolete and

coming with new and modified technology. But the question is why organization has to adopt new technology and upgrade the previous one. Many factors are involved to answer this question. There can be 2 categories of the reasons. - Benefits of the upgradation - Risks or problems If we go for benefits there are many benefits regarding technology upgradation defined and searched by different researches. According to the (gentzer, 2002), “ the technology upgradation increase the productivity. Other researchers like Baldwin, Diverty and Sabourin. Adopting new technology also increase the flexibility in the production process or overall organization process (beanmount & Schroder, 1997). If we talk about the problems, then those problems of which the solution is upgradation or adaptation of new technology. That if the technology is not upgraded or adopted there will be risk for the firms. For example risk of or problem of competition is the factor for organizations for which they upgrade the technology. 1. 5 UPGRADATION IN PAKISTAN: In Pakistan government of Pakistan is also considering this as a vital issue and its benefits in the long run. In Pakistan “ Technology upgradation and skill Development Company" is working for the development of the organizations. This organization has been established by Pakistan’s Ministry of industries and production to upgrade technology and skill of key and strategic industrial clusters and connect Pakistan to the global value chain (www. tusdec. org. pk). And in skill developing projects TUSDEC's Skill Development Group identifies existing skill deficits after conducting in depth surveys and delivers 'customer-focused' training solutions. We have recognized that Pakistan needs to enhance all skill levels from the basic all the way to grooming a cadre of skilled managers. This

approach will catalyze a quantum improvement in vocational, technical and management skills by: - Assessing, planning, developing and delivering 'need based' training through short and long term courses and workshops - Conducting 'demand driven' training programs for industry - Offering consultancy and advisory services - Designing and conducting International Executive Management programs and Technical Training programs - Providing an opportunity to obtain Internationally Recognized Skill Certificates and Diplomas through SkillTech International's campuses in Lahore and Karachi Assimilation of technology upgrades help expedite value addition while enhancing productivity. Mass production of high value products will ultimately bootstrap the economy to increase the gross domestic product (GDP). Technology upgrades in developing countries can take them to the next development/time curve. In Pakistan, with abundant human resource, the use of modern techniques and skill development will help 'jump the curve' to the next orbit of economic progress. A series of 'jumps' to higher levels through technology upgrades will close the gap to reach parity with the developed world. In their research section some objectives and activities are as follows: - Research on technologies in use in Pakistan with global benchmarking - Research latest technologies available for upgrading important industrial sectors - Technology Gap Analysis of industrial clusters and assesses impact on GDP - Develop technology databases - Assist and support industrial clusters on technology acquisition - Identify shortcomings in installed technology and impact on derivative products (www. tusdec. org. pk) So in Pakistan, vital work is performed by the government to upgrade the technology as they understand the

importance and benefits of technology adoption and upgradation. 1. 6 RESEARCH STATEMENTS: This research is based or the problem of identifying the factor involved in the upgradation or adaptation of the new technology the problem statement is: “ What are the factors behind the upgradation or adoption of the new technology in Pakistani manufacturing organizations? " 1. 7 RESEARCH QUESTIONS: The research questions for this study are according to the organizational factor which we considered for the research and data collected about them from organization are: * “ Is production factors of an organization impact on its technology upgradation decisions? " * “ Is organizational structure impact on firm’s technology upgradation decisions? " * “ Is high competency level of the management leads the organization towards technology upgradation? " * “ Is due to cost minimization factor organizations upgrade or adopt new technology? " * “ Is different environmental factors force organization to upgrade the technology? " * “ Is IT level of an organization leads it toward new technology adoption? " 1. 8 OBJECTIVE OF THE STUDY: The objective of this study is to explore the factors that drive manufacturing organizations to upgrade the technology or to take the decisions to adopt the new technology. And also have to see that what are the most critical and important factors that are considered by the Pakistani manufacturing organizations to upgrading the technology or upgrading the new one. We also see that what is the factor behind the decision of the upgrading the technology of the Pakistani firms? And what is the ratio of adopting the technology or upgrading the technology in previous 10 years in the Pakistani manufacturing organization. 1. 9 SIGNIFICANCE OF THE STUDY: This study

will help the industries in decisions making about the upgradation of the technology. And to consider the importance of different factors which are involved in the upgradation or adoption of the technology. This study will be a valuable source to the manufacturing organizations of the Pakistan when they are making decisions about technology adoption or upgradation. This research will also be helpful to the firms to enhance their knowledge about production company's technology adoption patterns; and to know that when and why organizations change or upgrade their technologies. This report will again will be helpful for the business students and professionals to understand the importance of different factors impacting on the technology upgradation. 1. 10 DELIMITATIONS: Any research cannot perfect otherwise not called " research". Every research has some delimitation that defines the boundaries of the research. In this study, data is collected from only manufacturing organizations. The manufacturing organizations are of textile, sports goods, leather, tantage, rice mills, and fertilizers from which the data is collected and taken for research. And only those organizations were considered as sample that have upgraded or adopted the technology at least 1 time in previous 10 years. The organizations are taken only from Punjab province of Pakistan. There is no age limit of the organization. 1. 11 HYPOTHESIS: The categories for that data is collected from the organizations are: * Production factors * Organizational structure factors * Competency factors * cost factors * IT factors * Pressures According to data and factors we have following hypothesis. For production factors (manufacturing productivity enhancement, quality improvement, flexibility, ease of use and product development) the hypothesis is: H1: " production factors of an

organization impact on its technology upgradation decisions" For organizational structure factors (competitive advantage, filling of gap between the firms machinery and new state of art, desire of being global, changing trend of the technology, partner's alliance, customer demand and perceived benefits) there is the hypothesis: H2: " organizational structure impact on firm's technology upgradation decisions" For competency factors of the firm (training, education of the management, confidence of the management, owner's personal characteristics and competence) the hypothesis is: H3: " high competency level of the management leads the organization towards technology upgradation" For cost factors (production, sales and communication) hypothesis is: H4: " due to cost minimization factor organizations upgrade or adopt new technology" For factors that show pressure towards the firms to upgrade the technology or adopt the new technology like (government pressure, customer pressure, public pressure, shareholders pressure and supplier pressure) the hypothesis is: H5: " different environmental factors force organization to upgrade the technology" For IT factors (availability of technology resources, quality of the technology information, access to the information and level of IT in the organization) there is the hypothesis: H6: " IT level of an organization leads it toward new technology adoption" CHAPTER 2 LITERATURE REVIEW 2. 1 LITERATURE: According to Fischer efficiency and effectiveness are the drivers for the new technology adoption, but efficiency and effectiveness are not by themselves realized by the adoption and utilization of the technologies instead of it these benefits ascribed by the actions or performance they perform by the adopters (FISCHER, 1996). As the " Need is

a precondition for the adoption of an innovation" (Dieperink, Brand, & Vermeulen, 2004). The factors like increasing level of economic development and more competitive infrastructure of the industries can be determinants of the technology adoption or upgradation by a firm (Julien & Raymond, 1994). Technology accepting organizations can be distinguishes by the factors like higher profitability, the incremental cost of new equipment or machinery, the profile of the management or management’s, owner’s personal capabilities, organization’s level of complexity, centralized or formalized structure, the type of the strategy they use and lastly the quality of the technological information that how much it is authenticated (Julien & Raymond, 1994). Ebusiness adaptation in the context of enforcement; by the society and relationship technology these are very important factors that contributing to retailer adoption of manufacturer's ebusiness tools or techniques. This build up the measures for the retailer’s ebusiness adaptation in demand and supply actions or practices as well as the retailer sales power and benefits regarding orders (Talai, 2010). Different organizations considerably different in the investment that they invest in information technology and the organization’s size (respect to the earnings and quantity of the workers) does not manipulate the speculation levels in information technology and assessment technique adopted by Small and Medium Enterprises are used as for the controlling and learning and in the end a major hurdle to mitigating investments in the information technology was ascribed to have not any tactical image. While organizations had not experienced any considerable divergence in strategic and operational paybacks that have been incurred after the adaptation of information technology, divergence was originated

with the respect of strategic paybacks (Love & Irani, 2004). The management plays an important role in technology adaptation, as deficiency of management guiding principles to help in the decision making about the investments, may be force organizations to adopt one of many doubtful positions like a rejection to implement an information technological infrastructure that could help to the firm's longer term profitability or outcomes (Love & Irani, 2004). SMEs usually adopt IT to improve productivity (cost efficiency) and performance of business processes. The factors as competitive advantage, development of service value and firm's profitability are also recognized as main incentives for information technology adoption. About 70% of the firms suggest that an incentive for the adoption of information technology is to support the strategic routes of the organization. Other then these pressures from competitors, who are applying information technology, support the strategic routes of the organization; advance service quality and developed market share are the factors behind the upgradation or adaptation of the technology (Love & Irani, 2004). 2. 2 AGRICULTURAL TECHNOLOGY According to the adoption of energy effectiveness increasing technologies by diverse firms, the reality is that energy usage does not just because the outside ecological costs throughout effluence, although also straight affects the effectiveness of the firm and thus its behavior on " input and output markets is taken for granted" (Verhoef & Nijkamp, 2003). So the one driver behind the upgradation or adaptation of the technology is technology effect on the environment and the other one is profitability of the firm. The factors threat, ambiguity and knowledge play important and divergent roles in the procedure of adopting innovative technologies. The

factor risk has frequently been considered as a critical factor eliminating the level of adoption of a new technology and the knowledge and education makes better the farmer's ability to adopt and apply the new technology. Learning allows the farmer to make better decisions about the new technology (Marra, Pannell, & Ghadim, 2003). " Perceived net benefit; mentioned as the potential benefits of precision agriculture technologies include reducing production costs, increasing yields, protecting the environment". Apparent direct benefit incorporated the related advantages of using agriculture technologies over present performs with contemplation of monetary cost concerned in adopting and applying the technologies. Perceived net benefits are the idea that the " technology will provide benefit of greater value than its costs". Other demographic factors that may have effect on the technology adoption decisions are like " age, farming experience, education level of farm managers/owners, off-farm employment, farm size and crops grown influence the adoption of precision agriculture technologies" (Daberkow & McBride, 2003). Economic benefits are the main motive given by producers or growers to accept agricultural technologies; other mind-sets play important roles in the technology upgradation decision. Considerate grower' opinions and attitudes can guide researchers and retailer to develop products that address producers' concerns in incorporating difficult-to-use technologies and build up conducts to express the advantages and usage of these products or commodities (Adrian, Norwood, & Mask, 2005). There are a number of benefits that farmers expect to gain from access to information technology. For better understanding, these factors can be divided into two major categories. One is primary that

reflects an assembly point on cost elimination, in which computers and Internet access are used to mechanize tasks and decrease operating costs. In this casing, the major outcomes of adopting the information technology flow from cost savings. The next region related to paybacks that growers might achieve from encouraging innovation. In this situation, “ information technology allows and encourages new ways of doing things, stimulating additional productivity". In this situation, the repayments of upgradation come from amplified productivity, instead of cost decline (Rolfe, Gregor, & Menzies, 2003). With regards of agriculture technology the factors which influence the decision of adopting new technology are socioeconomic distinctiveness, such as size of the farm (Khanna, 2001), farming experience, education (Hudson, 2003) and access to the information (Daberkow S. , 2003). Other factors that impact on technology are many as “ technology profitability, the location of the farm and physical attributes of the farm, such as variability of soil types" (Adrian S. A., 2005). And the other factors like economic profitability and attitudes towards technology adoption (Cochrane, 1993). Implementation of information technology impacts may straight to production gains, as divergent to reductions in operating costs. There are several areas where this might happen, including: “ better retrieval and evaluation of available data for management purposes, development of management decision support systems, development of processes for quality assurance and external regulatory compliance requirements, better links to remote sensing and geographic information systems data, better links to technical and other information, better links to agricultural suppliers, more direct feedback from customers and consumers, improved supply chain

management, opportunities for marketing and other networks to emerge" (Rolfe, Gregor, & Menzies, 2003). Industry reserves in IT does not only produce regular charges of outcome by replacing labor, but permit a great deal greater output gains to be prepared. In current years, “ agricultural enterprises have adopted information technology at a high rate, suggesting that agricultural producers are gaining real benefits from employing information technology in their businesses, however, these benefits have been difficult to identify and quantify" (Rolfe, Gregor, & Menzies, 2003). As the old pipe line technologies guides organizations to “ higher investments and higher labor, operating and maintenance costs for companies which in turn decreases the productivity of the company (lower output per unit of inputs)" and on the other hand new technologies can guide to an raise in productivity due to cost reserves and validation effects in the production procedure (Getzner, 2002). Other than this, the Social conflicts in a wider circumstance of sustainability contain amongst others the standard of livelihood, value of jobs, and self-governing culture consequence on the decisions of the upgradation or adaptation of the technology. The economic advantages as a factor of technologies have also been recognized extensively in quantitative and qualitative terms (Tietenberg, 1998) (Getzner M. , 2000). Other factors mentioned as the upgradation of technology makes better the amount and value of service in the companies apprehensive but the effect on service differs according to several significant factors (Getzner, 2002). The usage of IT by the “ suppliers, customers, and competitors significantly affects firms’ inter organizational system adoption decisions" (Teo, Wei, & Benbasat, 2003). There are many factors like “ supplier

selection, purchase order processing, invoicing, logistics planning, and demand management, and externally for use in B2B transactions with partners in supply networks" that effect on adopting the technology (Zhang & Dhaliwal, 2009). The technology ultimately upgraded will also be improved and have inferior contamination concentration. The “ Lack of managerial skill, inadequate capital markets, and the fact that technologies can be evaluated along various dimensions" are the factors that effect on the adaptation of technology (Soest & van, 2005). Some factors identified important for the adaptation of the information technology are “ perceived benefits, compatibility (organizational and technical), complexity and management support". When large number of firms adopt a technology the technology becomes legitimized and quite than asking “ why do it", firms begin to ask “ who is doing it" and “ why are we not doing it" (Beatty, Shim, & Jones, 2001). “ The larger organizations stand on an unyielding foundation with more resources and better capability in tackling risks; After growing into a certain level, an organization will be able to adopt innovative technology" (Grover & Goslar, 1993). The factors distressing the adaptation or upgradation of inventive technology can be discovered in variety of magnitude like “ organizational factors containing management support, resources, user participation and project related factors like resource, user participation, team skills and technical factors high quality source systems, better development technology, etc. According to an empirical research conducted (Alavi & Leidner, 1999) the success/failure of adopting KM can be seen from three aspects of management, knowledge and information content, and technology". The technology has the capability to create

shortcuts in working and can make tasks easier also (JaBoo, 2005). “ Need for organizations to employ techniques that can decrease workload, including those affecting technology implementation decisions, the culture of public accounting may create impediments to the adoption of new technologies by audit teams. Factors affecting an in charge’s decision to implement new technology on an engagement, including two contextual or firm-level factors (length of the engagement budget period and remote superior influence) and two individual characteristics (risk preference and perceived budget pressure). Technology cost more first time they are implemented and then they save in that first era and also are likely to cost more than the overall improvement in audit quality gained in the first period. And firms have the ability to manipulate the implementation of new technology by using longer term budget and evaluation periods" (Mary, Curtis, & Elizabeth, 2008). The execution of technology is linked with extended phrase outcomes (Lovata, 1988). The factors behind the upgradation or adaptation of the technology are performance expectation, effort expectation and social pressure (Venkatesh V. , Morris, Davis, & Davis, 2003). Big organizations have a propensity to accept innovations for technology decisions to a bigger degree than small organizations. Firms should act in response to particular doubts in the, savings decisions for adopting the technology (Verbeeten & Frank, 2006). The factor behind the adoption of the technology or improving it is that the newer technology is cheaper than the old one. New technology is less labor intensive and more productive. It also depends on managers of the organizations recognizing the need for a instantaneous process of organizational restructuring (Millard,

Ducatel, & Jeremy, 1996). Investigators say this “ embodies an attempt to eliminate the traditional division between the user and the machine. Virtual reality is anticipated to provide a means of naturally and intelligently interacting with information. Virtual reality is competing to be the interface of the future, allowing ordinary users to use their senses to interact with complex data. Mostly all advances in technology have an impact on society at large, and virtual reality is definitely one of them. Virtual realism will have major effects, both positive and negative, on our society in the future. While at present only in the beginning stages, virtual reality could change our future way of life drastically" (Biocca). The effects of factors on technology adoption are Access as for other technologies, “ effects of access on adoption were confounded by technologies being better adopted in those agro economic zones to which they were better adapted and by agro economic zones being an important determinant of access". Altitude of adoption of the technologies was “ consistently and significantly affected by the level of extension input. Amplified levels of expansion input were associated with increased levels of technology awareness, with increased rates of trying once aware and with a lesser frequency of information and/or inputs related constraints" (Subedi, Floyd, Harding, Paudel, Rasali, & saaudi, 2003). The upgradation of superior technologies is intimately connected to productivity outcomes and other trial of organization presentation (Baldwin, Diverty, & Sabourin, 1995). “ The judgment to adopt advanced technologies ultimately rests with the benefits the technology provides and the costs associated with its adoption. Factors behind the upgradation or adaptation of the technology are many such as improvements in productivity, product

quality and working conditions; reductions in production costs associated with such factors as lower labor requirements and inventory, reduced material and energy consumption, increased equipment utilization and reduced product rejection (Baldwin & Lin, 2002). Payback of technology use is far ranging from increasing productivity, to improving flexibility, to producing higher quality products, to reducing production costs" (Beaumont & Schroder, 1997). 2. 3 PRODUCTION BENEFITS: Development in output happen when the similar output can be formed with smaller quantity inputs. That guide to a decrease in manufacture expenses. “ Production costs can also be reduced when lower cost inputs can be substituted for higher cost inputs, when lower skilled labor can be substituted for higher skilled labor. Flexibility is a benefit when product line diversity can be extended by new technologies. Product quality improvements result from lower scrap page rates or from more reliable products, i. e. power sources for computers that have lower failure rates". A development in general output (from time to time submitted to as whole factor output) is the most often described benefit connected with advanced technology adaptation (Baldwin & Lin, 2002). On the whole “ productivity improvements can be achieved through a variety of means, e. g. a reduction in labor usage, raw material or energy consumption, and better equipment utilization. To a range of degrees, advanced technology users identify benefits in all of these areas. But the governing category here is a reduction in labor requirements. Another most important benefit resulting from the adoption of advanced technologies is an improvement in product quality. As a final point, a good percentage of firms report that working conditions had improved as a result of advanced

technology use. In summing up, advanced technology users report an impressive list of benefits, with productivity and quality improvements being the most important". Manufacturing relayed on the technology choice of the organizations. “ More advanced (more productive) technologies involve a greater range of intermediate goods and thus a higher degree of specialization. A firm decides on technology (on the range of specialized intermediate goods), recognizing that a more advanced technology is more productive. There is a relationship between the firm and its suppliers, on technology choices. A greater range of intermediate inputs increases productivity by allowing greater specialization and thus corresponds to more advanced technology" (DARON, POL, & ELHANAN, 2007). Other factor which influence the upgradation or adoption decisions are “ Improvement in productivity, reduction in labor requirement, reduction in material consumption, reduction in energy consumption, increase in equipment utilization, increase in capital requirement, reduction in capital investment, reduction in inventory, improvement in product quality, reduction in product rejection, reduction in setup time, increase in product flexibility, improvement in working condition, reduction in environmental damage and increase in skill requirement" (Baldwin, Sabourin, & Raï¬quzzaman, 1996). Precise construction troubles or the requirement to improve the general product and procedure flexibility might additional motivate technological modification. Technology might also be the base for enhanced products to keep up a pressure over opponents. “ The first and most obvious reason is to upgrade or adopt the technology is customer needs and wants. Competitive and environmental change may compel companies to seek new

technologies. Companies must be rapid and decisive, knowing exactly what requirements and constraints are placed on the technology being sought, where to look for it and how to acquire it". Organizations should congregate together and farm out tasks for discovering the innovative equipment (NOORI, 1997). The mission of selecting the appropriate technology can be more simplify by analyzing five main factors. “ Companies that bring together their analysis of these variables with each phase of the guideline of technology adoption will be able to address the majority of influencing elements. These are some variables that are complexity; the greater the complexity, in general, the greater the degree of automation required, precision; the greater the precision required, in general, the greater the degree of automation required, Batch or lot size; the larger the lot size, in general, the less the degree of flexibility required in the manufacturing process and equipment, diversity; the greater the diversity of models, in general, the more flexibility is needed" (Noori, 1994). Both commentator and dealer firms graded factors such as “ R&D, product design and marketing skills somewhat lower than factors such as quality, manufacturing skill and prompt delivery. This may replicate the importance that these companies place on their current role as assemblers of final products. With high opinion to the actual impact of the technology on anchor companies, the greatest impact was achieved in the areas of better quality followed by reduction of direct labor costs, increase in offering a wider range of products and greater capacity to meet demand. With value to the genuine impact of the technology on vendor companies, the greatest impact was achieved in the area of faster turnaround, reduced direct labor costs and reduced overall unit

costs. With respect to strategic factors for technology upgradation, anchor companies expected stability of customer relationships, interaction with customer and introduction of new product lines to have the most important strategic benefits. On the other hand, vendor companies projected flexibility, customer relations and interaction with customers to be of greatest strategic benefit (NOORI, 1997). Firm's predictable benefit from advanced technologies exceeded actual benefits, however, overall, they found the adoption of advanced technologies was successful. In a survey firms experienced increased quality, reduced costs, faster turnaround and greater capacity among other improvements". The concept of advantage categorization is not latest, with having separated the paybacks attainable by the upgradation of technology into two classes, named as direct benefits and the 2nd is intangible benefits (Tayyari, Kroll, Parsaei, Ward, & Karworski, 1990). (Peters, 1994) Propose that the benefits of information technology or information system adaptation incurred into three classes: “ enhanced productivity, business expansion and risk minimization. Although the search for benefit identification can contribute to the success of an IT/IS investment, organizations have often found it difficult to evaluate them and as a result tend to use notional arbitrary values for assessing benefits" (Ballantine, Galliers, & Stray, 1996). As in the structure industry, (love & Irani) originate that “ over 60% of organizations did not prepare a benefits delivery plan or have access to benefits related performance data. Indeed, most firms sampled by (love & Irani) believed that benefits would simply accrue after technology had been implemented. On the other hand, strategic and operational benefits focus on efficiency and so are able to be identified and

quantified more readily. And the cause for this is that they relate to specific departments or processes and therefore their immediate impact can be determined" (Love, Irani, & Edwards, 2004). The implementation of innovative technology plays a fundamental function in the improvement procedure. There is huge difference, contained by areas and between them, in the level to which people have taken the advantage from the accessibility of these latest technologies. Literature illustrated “ by the well known positive correlation between wealth and adoption of new technology. Practical work in development economics argues that technology adoption (and income maximizing production choices more generally) may be hindered when returns are risky and insurance or other financial markets are imperfect" (Giné & Yang, 2009). Most of these procedures use from the “ Theory of Reason Action (TRA), which suggests that attitude (the individual’s beliefs) can explain behavior and Theory of Diffusion (Rogers, 1983), which suggests that adoption of an innovation is dependent on an individual’s perception about the innovation. Information systems research shows that attitudes in the direction of a technology", mainly people’ thinking of their individual capability to learn the use of technology. 2. 4 TECHNOLOGY ACCEPTANCE MODEL: Some of the factors behind adoption of the technology or upgrading of it are these, like Perceived usefulness, as the author (Davis, 1989) describes “ perceived usefulness as the belief that using a particular technology will enhance the potential user’s job performance. A latent user of a technology who perceives the technologies as useful is more likely to adopt the technology. Factors like perceived ease of use, another variable that influences the intention to adopt information technologies, as the belief

that using a particular technology will be free of physical and mental effort. Insight of ease of use could affect the intent to adopt technologies through perception of usefulness. Confidence, the confidence subscale is used to measure the confidence of a producer to learn and use precision agriculture technologies. The approach of having the ability to learn and use technology influences the perception of usefulness since the expectations of the technology is derived from how well one can use the technology and is motivated to use the technology" (Compeau & Higgins, 1995). “ Technology upgradation or technology adoption in fact base on the Technology Acceptance Model (TAM) is an information systems (System consisting of the network of all communication channels used within an organization) theory that models how users come to accept and use a technology, The model suggests that when users are presented with a new software package, a number of factors influence their decision about how and when they will use it, notably: Perceived usefulness". As described by Fred Davis that " the degree to which a person believes that using a particular system would enhance his or her job performance". And the perceived ease of use, Davis clear this as " the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989). Though according to the technology acceptance model, “ if a user perceives a specific technology as useful, he will believe in a positive use performance relationship" (Mazhar, 2010). The TAM (technology Acceptance Model) is being used widely to clarify and forecast customers’ personal opinion to adopt or upgrade the new technologies. A number of representations have been anticipated to direct investigation into this fact (Cheong & Park, 2005) (Venkatesh, Morris, Davis,

& Davis, 2003). The fundamental “ theoretical premise underlying TAM is that an individual’s intention to purchase a product or service is determined by two factors: perceived usefulness and ease of use. TAM, which has been particularly personalized for modeling user acceptance of information technologies, explains the determinants of computer acceptance by tracing the impact of external factors on internal beliefs, attitudes, and intentions" (Davis, Bagozzi, & Warshaw, 1989). In technology acceptance model (Davis, Bagozzi, & Warshaw, 1989) described the phrase ‘‘ perceived usefulness’’ and explained it as “ the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organization. As (Phillips, Calantone, & Lee, 1994) introduce a construct which is equivalent to perceived usefulness but more relevant to organization perception: ‘‘ perceived benefits of adoption.’’ This construct is defined as the potential adopter’s biased evaluation of the utility of the technology and the opinion that applying the technology will be beneficial to the company’s well-being. To the adopting firm, the perceived benefit requires both economic and qualitative benefits consequential from adopting the technology, including amplified productivity, improved efficiency, cost savings, improvement in market share, and better customer service (Phillips, Calantone, & Lee, 1994). The additional benefits organizations can forecast from using the technology, the more likely they are to adopt the technology given sufficient support and facilitation" (Wang & Qualls, 2007). Technology paybacks come from many sources. “ The taxes and permits affect the model of adoption of an environmentally friendly technology when firms engage in imperfect competition on the output market and the regulator

commits to the optimal ex post amount of emissions. When the output demand is more flexible, the regulator speeds up technological diffusion by using auctioned permits instead of emission taxes or freely allocated permits" (Coria, 2009). Each particular technology's basic or direct personal outcomes have a tendency to be at variance from organization to organization and from individual to individual (DeCanio & Watkins, 1998). Another factor behind the adaptation or upgradation of the technology is subsiding by the government as the “ impact of subsidies on adoption behavior by means of an economic laboratory. There are no social penalties of the technologies adopted, only private ones; While social motivations (including corporate responsibility) undoubtedly play a role in many instances of real world investment behavior". In lots of countries, organizations and individual can gather government subsidies if they put into practice some technologies or appliances with publicly wanted distinctiveness. “ A lot of technologies and appliances give not only benefits to the owner, but also to society at large and technologies fluctuate in the per-period benefits they yield, and their purchase price increases with per period benefits provided" (Aalbers, Heijden, Potters, Soest, & Vollebergh, 2009). Plainly “ investing in new technologies is not likely to provide a competitive advantage and that the full benefits of new technologies are only realized when they are used together with new workplace organizations including training". This literature is in great fraction an endeavor to clarify “ skilled biased technological change", which appears to have directed to enlarged requirement for extremely expert workers, comparative to demand for in lesser amount of expert workers (Yan, 2006). To assess “ potential

benefits generated by new energy options. This technique allows us to account for a multiplicity of economic, social and environmental indicators, but especially for a particular form of benefits, termed as Ordinal Benefits. When substitute technologies are compared, financial evaluations related to capital profitability and operational costs tend to prevail". Economic paybacks occur from the investment monetary payback to the company and the public as a whole. The next typology of reimbursement communicates to the conventional design of externality (Giannantoni & Zoli, 2010). Social policies from the previous three decades, “ the descriptive power of theories of regulatory politics, the choice of regulatory instruments, the assessment of regulatory impacts, and the influence of each of these on the innovation and diffusion of technology (and of regulation). Over time and crossways countries, institutional factors such as regulation obviously have a major influence on the rate of technological change and thus on societal prosperity. Technological transform is generally ascribed with half or more of productivity growth. Technological change itself can decrease risks by introducing better new methods of production" (Innovation and the environment, 2000). In fact “ regulation is a set of techniques for changing production functions to produce less of some outputs, such as pollution, or more of others. Regulation is the technology of governance. The control of regulation on technology is critically dependent on the technology of regulation. Diverse regulatory designs can impede or accelerate technological change, or shape it in varying ways, favoring some kinds of technology over others. The assessments are frequently conducted ex ante, before the decision to accept the new technology or regulation", and this is a

significant step towards technology upgradation (Wiener & Jonathan, 2004).

2. 5 ORGANIZATIONAL FACTORS: The reality is that, while companies are seeing for effectiveness, they are in institutional limitations as well as a variety of communal prospects and norms that may be in clash with effectiveness. “ Institutional factors influence a firm’s adoption of an innovation have been mixed. On the other hand, organizational culture is establish to be a key factor influencing supply chain management practices and innovative information systems adoption. A firm is more possible to adopt an information system if the values embedded in the system fit its organizational culture. Together institutional and cultural factors might affect a firm’s tendency toward Internet enabled Supply Chain Management systems adoption, the direct effect comes from institutional pressures and organizational culture moderates the underlying process of such effects". “ Internet enabled Supply Chain Management systems are the technical enabler of the orchestration of value chain operations across firm boundaries. Reaping the benefits of Internet enabled Supply Chain Management systems poses great challenges, especially given that a firm cannot adopt them independently of other firms in the field" (Teo, Wei, & Benbasat, 2003). To upgrade internet enabled SCM systems, the company needs to shift from a traditional, arms length relationship with its channel members to a precise, long term business partnership, which certainly guides to high interdependence (Morash & Clinton, 1998). As mentioned by the researchers “ the success of Internet enabled Supply Chain Management a system relies on the adoption by the focal firm’s supply chain partners and the diffusion of such systems in the industry. For real adoption decisions to

occur a lot of other factors, such as resource constraints, could be playing a role in the process and our results would be less clear. The firm's observation of these pressures affects its interpretation of the environment in general and innovation adoption. Normative pressures pass on to the pressures that branch from collective expectations within particular organizational contexts of what constitutes appropriate and thus legitimate behavior". " Normative pressures were calculated by three items on the extent of Internet enabled Supply Chain Management systems adoption by suppliers, customers, and competitors in the focal firm's industry. ; Mimetic pressures were considered by three objects on the perceived success of competitors that had adopted Internet enabled Supply Chain Management systems; coercive pressures were measured by four items on the perceived dominance of supplier adopters and customer adopters" (Liu, Ke, Wei, Gu, & Chen, 2010). " Absorptive capacity and experience; the firm's ability to absorb knowledge from external sources is another major determinant of innovation and technology adoption. There are mostly two aspects of a firm's absorptive capacity for new technologies: initially, the firm's overall ability to assess technological opportunities in (or around) its fields of activity in terms of new products and production techniques, which depends primarily of the firm's endowment with human and knowledge capital (Cohen & Levinthal, 1989). Next, learning effects that may come up from prior use of a technology or from experience with a predecessor of a specific technology embodying constituent elements of later applied more advanced vintages" (Windrum & de Berranger, 2002). Institutional stress work in performance with other pressures, like as competitive or market pressures, to influence

environmental actives (Carpenter & Feroz, 2001). The pressure of “ financial constraints on the dispersion of new technologies is a theme that has been recently introduced in the literature, although it is widely accepted that the availability of funds conditions investment decisions, its effect over particular innovations has not been extensively studied (Stoneman, 2001). The traditional analysis of distribution has studied the introduction of one technology in isolation from other technologies. However, technologies may be complements or substitutes and the decision to adopt one type may either increase or reduce the probability of introducing another". It is all the way in the course of their distribution as “ the goods of invention and innovation become widely available to users and produce their economic benefits; in exacting, the adoption of new process technologies has been shown to have positive effects on firm performance and competitive advantage" (Stoneman & Kwon, 1996). This research emphasizes upon the effects of companies’ economic barrier and absorptive aptitude for the machinery adaptation. About the grower, “ it is numerous to find that larger firms are more likely to introduce new technologies. As (Astebro, 2002) has exposed, this result could be due to reasons linked with size. Technologies might be complements or substitutes in the production proc ess (Stoneman & Diederen, 1994). This can make a serious problem when estimating models of adoption. On the other hand, recent methodological developments on multivariate probate models that allows the joint estimation of the adoption equations for different technologies" (Cappellari & Jenkins, 2003). The firm’s internal dispersion of latest technologies proceeds as each firm takes the decision to spend in a new technology. The spending in technology

adoption or technology upgradation is initiated by four main types of factors: “ rank, stock, order and epidemic effects" (Karshenas & Stoneman, 1993). “ The subsistence of rank effects is based on the assumption that firms are different in terms of the relevant characteristics that determine the profitability of using an innovation. Stock and order belongings pass on to the number of competitors adopting the new technology and the position of the firm in the order of adoption. On the one hand, the marginal effectiveness for an adopter diminishes as the quantity of competitors using the new technology rises (stock effect). On the other hand, early adopters get hold of higher returns from the adoption of new technology (order effects). Finally, the pandemic effect captures the thought that the decision to adopt depends on the amount of information accessible on the existence and profitability of a new innovation, which increases as the number of users of the new technology grows". Some authors have investigated substitute explanations for the effect of firm size. “ Noncapital investment expenses, equipment alternate, risk aversion and learning and more importantly, within this the line of investigation, firm size has also been a variable frequently associated to the availability of financial resources in a context in which financial markets are unsatisfactory" (Fuentelsaz, GÃ³mez, & Polo, 2003). The beginning of numerically proscribed tools effects by the adaptation of tools. Though, this is truth that the implementation of new technologies might be predisposed by management and customers (Leonard & Deschamps, 1998). “ Larger firms are capable to spread the cost of investing in a new technology among a high number of units or they are more likely to possess the specialized complementary assets needed for the commercial

success of innovations" (Teece, 1986). Firms are likely to have “ more equipment in use than smaller firms and, consequently, they are expected to have more equipment in need of replacement. Succeeding, the wider array of operations in which they are involved makes it more likely that they perform activities suitable for the use of a new technology. Lastly, larger firms have more assets available to them and are more likely to be able to finance an investment and to absorb a loss should a risky investment occur". “ The introduction of an innovation may have need of significant investments in order to acquire the units needed for production. In the case of process innovations, the costs connected with reformation the production process and the costs of knowledge how to use the innovation effectively may impose additional charges on adoption (Jaime & Pilar, 2009). Away from size effects, firms with extensive internal financial sources may find adoption easier" (Stoneman, 2001). The attitude of companies is to some extent different depends upon the industries to which they are linked to and these distinctions are considerable. Furthermore, “ both the existence of foreign investors in the capital of the firm and its corporate status could be affecting the adoption decision. The outcome of these two variables on the introduction of the three technologies is not obvious. The cause of market structure on innovation has been one of the most debated relationships among researchers. Firm size, the strength of R&D investments and the ratio of exports to sales are significant for explaining the different behavior followed by the firms included in the sample, being positively associated to having introduced the technology" (Jaime & Pilar, 2009). Firm size: “ those organizations less financially embarrassed would have a higher probability of

having adopted the three technologies. As regards the effect of control variables, market structure seems not to have at all effect on adoption. The estimations verify the role of firm size, financial constraints and absorptive capability in explaining the adoption behavior of manufacturing firms in Spain". The capacity of a firm to take up new technology did play a considerable role at explaining adoption patterns (Jaime & Pilar, 2009). The “ introduction of firm effects into distribution analysis seems to be crucial. Both the casual effects estimator and the multivariate technique used point to the difficulties of suitably and fully specifying the determinants of the adoption decision (Jaime & Pilar, 2009). The larger organizations are more expected to be adopters of new process technologies. The accessibility of data did not allow us to search for substitute explanations that could explain this association" (Astebro, 2002). 2. 6 MANAGEMENT PERSPECTIVE: The next clarification is that adaptation supports the interests of managers with those of shareholders. This is assumed to happen subsequent a level of poor performance by the firm. Management agreements are restructured to return managers for growing the long run performance of the firm. Researchers find that the adoption of performance strategy by electric utilities is analytically connected to a move in their narrow environment, the stage of production efficiency, and modifications in their corporate plan (Brooks, May, & Mishra, 2001). “ Writing of environmental policy puts manager’s attitudes as determinant of innovation in a central point. The fundamental assumption is that radical changes in environmental attitudes of the firms’ CEOs and managers implies a reorientation of business strategy or at least its environmental planned behavior" (Corral, 2003). An inclusive

review of theory is there that some researchers, and practices on knowledge management build up a framework that compares on hand technology-push models with planned strategy-pull models. The outline gives details that how “ the important gaps between technology inputs, linked knowledge processes, and business performance outcomes can be bridged for the two types of models. Descriptive case studies of real time enterprise business model designs for both successful and unsuccessful companies are used to provide real world understanding of the proposed framework. Findings suggests dominance of strategy-pull models made feasible by new " plug-and-play" information and communication technologies over the traditional technology-push models" (Malhotra Y. , 2004). Willingness and attitudes of the management with the environmental policy play a key role to adopt the greening of the industry. Behind adoption of the greening technologies many factors are involved as “ public and shareholder pressures, regulations enforcement, market demand, community concerns, customer demands, liability, public image and social responsibility, cognitive and attitudinal factors such as perceptions, personality, efficacy, leadership, and environmental awareness and the ethics of mangers and CEOs, economic efficiency and opportunity, lack of technological opportunities and the necessity of generating a new knowledge base prior to attaining a sustainable industrial development; the industrial and trade relationships across the supply chain, the relation between end users and suppliers, the firms’ technological and organizational endowments" (Corral C. M., 2003) And for this industry has to adopt clean technologies and clean procedures that new improvement of a new technological store and regulatory systems

give confidence to innovation towards clean manufacturing. That upgradation in clean production systems is recently observed as one of the key economic multipliers of the 21st century (Corral C. M., 2003). Technology acceptance is directly determined by “ behavioral intention to use, which is in turn influenced by users’ attitudes toward using the system and the perceived usefulness of the system and perceived usefulness, reflecting a person’s salient belief in the use of the technology, will be helpful in improving performance" (Lee, 2009). As it is clarified by the researches that top management or directors or owners perform an important responsibility in the decision making procedure of technology innovation. “ Management support, attitude and involvement will be a crucial factor in the technology adoption process (Lefebvre, Mason, & Lefebvre, 1997). Research has also shown that technology projects are usually constrained by resources available to the organization, especially the budget to support the adoption. Previous research has verified that the technology budget has a great impact on whether organizations can eventually adopt the technology, irrespective of how beneficial the technology might be to the organization". It therefore, has an encouraging impact on the o