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Managing Innovation and Creativity

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Managing Innovation And Creativity

Dan Wilbanks, B.A.

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An Abstract Presented to the Faculty of the
Graduate School of Lindenwood University in Partial
Fulfillment of the Requirements for the
Degree of Master of Business Administration

1998

ABSTRACT

As businesses become more lean in the future they will have to do everything to gain a competitive advantage. People are the biggest resource and many times the biggest expense in an organization. Many experts are of the opinion that the single most effective way to insure a companies longevity is by having high output employees. There are many proven techniques in workforce motivation. Most managers and educators think higher production is the result of better motivation techniques. A normal motivation plan is designed to increase production in the employees' current job under the same set of rules and ideas.

Paradigm shifts in business are happening at a faster pace than ever before. When a paradigm shift takes place, all the rules and perceptions that a business operated under are now invalid. These shifts in thinking drive the need for business to motivate and foster creative and entrepreneurial thinking in their employees. Older techniques to motivate are useless in getting employees to find creative solutions to problems or invent new products or services.

American business managers are in a race for ideas to make products more innovative. How can managers set up an atmosphere and a reward system that encourages, and more importantly produces, new ideas to flow like the assembly lines of mass

production in the past?

This is an idea that has rarely been focused on. Managers have been more interested in controlling and directing major duties under the old paradigm. The new paradigm of business is getting employees thinking out of the box of business as usual. Many studies have not focused on the importance of creativity and innovation. Measuring the results of creativity and innovation is difficult. The culture of the business has to change and open up to promote, encourage and measure creativity. The purpose of this study is research what managers and employees should do to gain a new perspective on the ways they do business.

Hopefully this study will reveal the need for management emphasis in the creative and innovative area. Along with the need, the study will show what types of people tend to have the qualities that managers must look for in their recruitment. The people who tend to exhibit traits for creativity and innovation are driven by things that are very different than other employees and the two groups can not be managed using the same set of rules. The study will show what will drive these people in a direction to keep the ideas flowing and keep them focused on the current business problems. The study will identify creative and innovative behaviors and give insight into what others are doing to stay ahead of competition by developing new products or improving procedures and services.

The hypothesis of this study is that innovation is important for businesses to grow and to improve productivity.

Cameron's study showed an increase in economic growth was directly related to innovation. Many of the other articles and studies supported this hypothesis. This research focused on two primary areas for creativity and innovation. Programs and leadership initiatives from management and understanding what creative people are looking for in their careers. Knowledge can easily be spread among people with time and some effort, while creativity and innovation has to develop from within a person based on their experiences and environment. The previous studies, and this study are strong evidence that business will be well served to keep creativity and innovation in the culture or their organizations. Their competitive positions will require growth, and much growth comes from creative and innovative employees. The conclusion of this study is that innovation and creativity have been shown to increase a company's value and improve growth. Innovative and creative companies have been more successful at hiring and retaining employees.

Managing Innovation And Creativity

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A Culminating Project Presented to the Faculty of the
Graduate School of Lindenwood University in Partial
Fulfillment of the Requirements for the
Degree of Master of Business Administration

1998

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Chapter I

INTRODUCTION

Management will face many challenges in the future, just as they have in the past. The number of challenges might stay the same but the challenges themselves will be different than in the past. Businesses are facing competitive threats from all directions. There is market pressure to produce more for less costs. Foreign competition is also getting stronger. Very few management concepts will stand the test of time, but one concept that will survive is if a new and innovative product or service at a reasonable price is developed, customers will buy. People are ultimately responsible for creative and innovative ideas. A company's greatest resource, and it's greatest expense, is its people. How to manage and direct that resource is a major concern of today's business people.

Innovative and creative ideas are the life blood of today's business. To sustain a competitive advantage or to gain market share, managers must find a way to solicit ideas and creativity from all levels of employees.

Originally, United States plants were run as family businesses. Management communicated easily with employees. In the decades that followed the plants grew into large corporations

with many layers of management. Employee's jobs became specialized. As specialization grew, workers became more task oriented. Soon the workers lost sight of the overall goals of the company, and just focused instead on their small tasks. Rodger Firestine, author of "Empower Your Workers To Uncover Their Creativity" writes that the work culture was, and still is concerned with measurable output. Production has been the driving force, with no time left for problem solving, innovation or creativity. Friestine states that creative and innovative people need time to think and tinker with ideas. He believes this concept is very difficult for management to understand and commit resources to. The thought of an employee doing something that is not measurable in a production context is considered overhead. He says the first things cut in a cost reduction move are the overhead costs (1).

Julie Barker Author of "Bright Lights: Motivating Creative Employees," believes creativity and innovation are similar yet different. She says, "creativity is a thoughtful process to problem solving and the creative process is neither linear or predictable" (2). She feels this means, from a managers standpoint, it is much more difficult to produce creative ideas than a product. This is probably why many people believe this is very lacking in American business. Creativity is ideas. This is a very hard concept to measure or rate. Julie Barker states: "It's not like you can tell at the beginning of a journey how many steps it's going to take" (2). This thought applies to developing creative ideas as well. Although most experts agree that getting

new ideas is difficult, they also agree in the importance of new ideas. New, fresh ideas are the life blood of both new companies and existing ones (3).

Author Christina Shalley states, "Creative behavior is defined as behavior that results in identifying original and better ways to accomplish some purpose" (1). She says creativity can also be defined as combining known but previously unrelated facts and ideas, in such a way that new ideas emerge. This leads to the belief that creative people have a special ability to associate facts from different areas into useful problem solving information. Shally believes that past specialization of the work force is partially to blame for the demise of American creativity and innovation (2).

Management has always struggled with the thought of managing the creative person. Creative people are sometimes thought to be uncontrollable and unfocused. Some studies suggest an approach to remove obstacles instead of controlling creative behavior. Creative solutions happen at different speeds. These solutions don't always fit into manager's schedules. This is another reason creativity is often ignored instead of encouraged; managers can't fit it into their paradigms of project management. Project management is a current catch phrase used by managers. The basis of project management is organization, milestones and progress check offs. This is the very opposite of what is needed in a creative process. Benchmarks can not be set for delivering on ideas. George Newman, author of "Fatal Mistakes" thinks it is impossible to be fifty percent complete on the development of a

creative idea like one can on a construction project. He feels that once a creative idea or change to a process is presented, its progress can them be measured in a project management format (2).

This study will also explore where and how new ideas come to the surface. Research by author Allen Kay suggests that creativity is rarely produced by an individual who is unsupported. He feels many times creativity is a product of a number of people bouncing ideas off each other. Each idea and conversation leads the group closer to the eventual solution. There seems to be differing views on this subject however. Kay states that some experts feel people need time alone, to think about and test new ideas while others feel that the interaction with others creates synergy. These different opinions are a big factor in many decisions, like allowing employees to telecommute for example (Kay 2).

Thomas Kuczmarski, author of "Innovation Risk and Reward" states that; "Innovation, while different from creativity has many similar characteristics". Kuczmarski says innovation is the adoption and use of some new product, process, or service. While creativity is the thought process to solve problems, innovation is the practical use of new ideas. Creativity develops new and fresh ideas, innovation applies those ideas in ways that the inventor might never have thought possible. He believes one creative idea could produce many innovative uses and applications of that idea. Kuczmarski states; "Many times the greatest gain from an idea is not the inventors intention, but the ingenious application of someone in a totally different field" (2). He reinforces his

point with an example using the product 'Tang' an orange flavored drink originally created by scientists working on the Space Program. This idea has been widely marketed as a breakfast drink since its creation for space flights.

Kuczmarski believes the need for innovation in business is ever increasing. He thinks things that sold business in the past, such as dependability are no longer good enough. These qualities are so common that their value is taken for granted. Expectations continue to rise at a rapid rate. According to Kuczmarski, increased competition and the availability of information contribute to this rapid increase in customer's expectations. The better the service and the better the products, the more the end consumer wants. He believes that what satisfied consumers fifty years ago would not even be considered satisfactory today. Kuczmarski states, "The world is constantly changing, businesses have to follow" (2).

Charles Morris, author of "The Coming Global Boom" says that innovation is divided into two different categories. Morris describes incremental and revolutionary innovation as similar with both being important to the future of business. He says that revolutionary innovation is where a totally new product or service is introduced to the market. Being the first to introduce something altogether new, places a company in a very good strategic position. Revolutionary innovation could be taking a product, service, or concept and applying that to a totally different type of business. An example of this type of revolutionary innovation is the scientist at 3M corporation who

invented the yellow Post It Note pads. While trying to invent a strong adhesive, the scientist created a glue that was weak and barely sticky. This new glue had no application as a strong adhesive, which was the original goal, but had a use for the Post It Note concept. The weak glue created a very successful product for 3M. This didn't happen by accident, but by an innovator. This person, or group of people, had the vision and insight to apply an outside product to form a new one. Morris describes incremental innovation as a continuous process to make small improvements to a product or services as to "reinvent" them. Software companies are constantly making these types of improvements. Microsoft Corporation's release of Windows 95 is an example of improving an existing product. Windows 95, while different, still has many of the same features and capabilities of previous Windows releases. Morris states, "Many companies report that the biggest return for their dollar invested is innovation" (56-58).

Many authors agree that innovation is very important. Author Micheal Verespej writes about two different strategies for innovation. One innovation strategy is to expand markets and revenue, the other is to reduce expense, overheads and organizational size. Verespej explains that both strategies are not without risk. One costs of expansion could be advertising for example. Expansion has many start up costs also. Research and development costs, expenses for new equipment, and possible salary expenses to start up a new venture, or jump start a new product, are examples of expansion costs. Small controlled expansions are

preferable to most companies. Companies that practice formal innovation techniques focus their attention on this type of strategy. Downsizing, or another contraction strategy, also has its costs. A contraction strategy focuses a company's innovation towards doing what they currently are doing with less expense. This might involve innovation of procedures or the automation of processes. The cost of innovations can quickly be repaid if the customer approval is high. Many times, with incremental innovations, customers will not repurchase the product until there are significant changes in the product. Depending on the price of the product, customers may need to be resold to entice repurchase. The incremental innovation of the product has to be good enough to justify repurchase. With revolutionary innovation there is usually a waiting period for many customers to see if the product is going to take off. Consumer acceptance will some times take time. There is also a waiting time to see if the products price will go down. Home computers are a good example of this type of innovation. When the latest and greatest feature comes out, the market demand is usually slow until it is apparent that the feature will be accepted by users. It is common for products developed through revolutionary innovation to carry a higher price. Computers are an example of high pricing until the product is widely accepted, at which time the price decreases. New innovations can also work in reverse. Some new products have actually caused a high demand for the older model products because of a lower price (Verespej 3).

Many of today's organizations are not structured properly to

achieve creativity and innovation. Martin Starr, author of of "Accelerating Innovation" states "The key to an organizational structure is to provide a fast response to customers and the market place". Many articles suggest the problems that organizations face have to do with bureaucratic constraints. Starr believes organizations have to provide an environment where a creative person is not only free, but encouraged to pursue creative ideas. Starr goes on to state that risk is an important factor and employees need to be free of some risk. He believes there will be some failure with innovation and creativity but the company will have to be patient if they are to realize the benefits of creativity. In Starr's article he feels each employee should be entrusted with the responsibility to accomplish the firms goals. He states that by letting employees accomplish goals in their way with company guidelines, is an effective way to get the employee's ideas. Problem solving is speeded up by this on the spot innovation. According to Starr, if mistakes are made everyone should learn from them with out fear of punishment. He says, a company totally free of risk is probably impossible, but managers should strive for a system that encourages intelligent risk. He describes intelligent risk as risk that is taken after much research and testing. Starr also believes that real creative and innovative people are not lazy and do not shortcut a thorough process of research before taking a risk. Any off the cuff risk should be avoided and not be confused with hampering creativity and innovation (2).

Anytime a new product is introduced into the market by a

company there is a risk. Kuczmarski's research indicates that sixteen thousand new products appear in grocery stores each year. This statistic indicates that many new products fail immediately or have a much shorter life span than planned. Kuczmarski believes the risk factor is ever increasing with pressure from management and consumers to produce new products faster, with shorter development times and with bigger payoffs. He feels that market pressures such as stock price and share-holder earnings, also make innovation very risky. He states that the challenges companies have are to balance the risks, both internal and external, with innovation and growth to be viable in the future. He believes risk is a part of innovation and can not be avoided, but should be managed and planned for (1).

Strategic risk involves the risk of not matching the new product with market need. Depending on the type of innovation, incremental or revolutionary, this risk could be great. An incremental innovation should be less risky than a revolutionary innovation. A product developed with a incremental innovation is a proven product that already has some market share. Many times a revolutionary innovation is a new product or new direction for the company which will have a much greater risk because there is no past product history to predict how it will do (3).

Kucmarski says the reason most products fail in the market is because consumers do not respond to the new product or change in the product. He calls this market risk. Timing is also a part of market risk. When a new product is introduced by a company, it might be the only entry in the market. Kuczmarski states "If the

development cycle is too slow, a competitor could beat them to the market and this could seriously impair the viability of the new venture." He feels if the new product is complementary to another product, that product's viability will greatly effect the new product's success. The computer industry serves as a good example. As soon as someone develops software for a particular type of hardware, the hardware changes and makes the software obsolete (4).

Kucmarski believes the first method of controlling risk is to determine how much risk a company can tolerate. If the risk is under or over estimated it could be harmful to the company. Over estimating risk could cause a company to avoid a venture that could be very profitable. Under estimating risk could cause a company to lose much more then they anticipated with a failure (5).

Managing creative people has long been a concern of management. Lynn Coleman author of "Want creativity? Learn to manage creatives" feels creative people should be able to take risks and should not fear management. She states that the last thing creative people need is to be controlled or confined. She says, "The best way to manage creative people is to give them respect" (2). Coleman believes management has to understand what motivates a creative person. She feels a creative person generally will not respond to praise for such things as attendance or punctuality. Coleman says that creative people will not stay with a company if they don't feel their work is important. Coleman believes the best way a manager can work with creative

people is to recognize their need for individual expression and still communicate the company's goals. This is a method of setting parameters for the creative person to live within. Author Julie Barker has a similar opinion. She says "Managers who don't understand that creative people are motivated by different things will lose them or see their performance plummet" (2).

Both Barker and Coleman say that an atmosphere where creative people are encouraged to take risks and break new ground is the best situation. Managers need to be supportive and yet know when to leave people alone. Coleman's research indicates that the biggest difference in creative people is that they generally enjoy their work more because creativity is a big part of their job satisfaction which is why they are willing to commit themselves to their jobs. (Coleman 3-4).

While managing creative people is a challenge for managers, it is worth the effort. Barker says, creative people are the source of their company's big ideas but, it's a great challenge to derive profits from those ideas. She feels that for managers to use those ideas in a business environment, creative people must live within deadlines and budgets (Barker 2).

Creative people are many times thought to be different and hard to manage. Barker says that coddling creative people is not necessary but managing things that get in their way is. She writes that managers must understand that creativity has its own rhythm that usually doesn't fit into business schedules. Barker advises "don't kowtow to the rhythm of the creative work but always respect it".

Barker's research has found that some company's creative efforts are too loose, with much freedom, while others have a more direct and structured approach. She has found both types of creativity work and show results. Barker writes that companys that have structured toward creativity, have training programs in tactics like associative thinking (Barker 1-2).

Barker describes two types of creative people. One is a wild off the wall person. The other is a creative person who defines a problem and looks for an organized solution. She feels both types offer value if they are put into proper situations (3).

A related theory to be researched is the capability of people to generate ideas. Author Austin Pryor writes; "All humans have the capacity to generate an idea worth pursuing at one time in their life" (4). According to this theory no one should be left out of the process. Manager's can't have pre-deterimined ideas about who can generate ideas and who can't. They need to listen to all employees. Similarly, a method to reduce risk is to have both customer contact and to encourage innovative thinking. Many times, especially in a large company, employees lose sight of end customer needs. A narrow job focus hurts an overall market perspective.

Organizational culture is a factor in implementing innovation. Author Mary Brannen feels that a key to achieving innovation is empowerment of the workforce. She states that the Japanese have done a good job of "empowering" their employees. She also believes American managers have been unsuccessful by coping techniques instead of concepts. One Japanese concept

thought to be the reason for increased innovation is the feeling of ownership in their company's processes and procedures. Brannen states that all things such as quality, improved production and innovation increase with a feeling of ownership. She believes that the culture within the organization has more of an effect on innovation than any other factor. The culture of many organizations was the employees would not offer ideas to an outside group. American companies have traditionally segmented their workforce. Cross training and customer contact was kept to a minimum. The culture was to do a job and only that job. Innovation requires a foundation of different backgrounds pulled together to solve a problem (Brannen 2-7).

The purpose of this study is to evaluate innovation and creativity to increase job satisfaction and productivity. The study will look at many different facets of running a business in a dynamic style that encourages and promotes innovation and creativity. Most industries require that new products or services be introduced to stay in business. This study will also research how to develop creative ideas that can be turned into new products or services. There are many different philosophies and techniques that deal with managing creative and innovative people. Many philosophies such as compensation, organization structure, and motivation will be studied. There are many methods and theories that deal with creativity and innovation. This is a new and exciting area of concern for business today. One thing that current authors do agree on is the extraordinary importance of developing an organization that fosters effective innovation and

creativity.

Chapter II

LITERATURE REVIEW

Businesses have been seeking ways to improve productivity for years. The subjects of innovation and creativity are the next new frontier to be explored by business. Many companies are investing in innovation and creativity training to gain a competitive edge. Joseph Coates, author of "Workplace Creativity" feels creativity is the basis for an advantage. According to Coates, one fourth of all companies with at least one hundred employees have some kind of creativity training. Frito-Lay has trained twenty five thousand employees, and large companies like Exxon and Corning have trained similar numbers of employees. These companies are making huge investments in this area. By investing considerable time and money in this area these companies are saying that innovation and creativity training is a new and very important field of study to improve products and productivity. Rubbermaid corporation also invested in creativity and innovation training. Rubbermaid produces about three hundred sixty five new products a year. They also improve about five thousand existing products a year. Rubermaid's objectives are to get into a new product market every year.

Rubbermaid's CEO believes the secret to competitive advantage is innovation. In spite of all the focus by many companies on innovation, Coates says "The realization of a corporate environment that truly promotes creativity remains ahead of us" (1).

Many authors are writing about the advantages of innovation and creativity in keeping an existing organization healthy or in starting a new organization. Coates believes innovation and creativity will challenge companies to improve. He states, "For many executives and managers a creativity program would be an assault on their traditional functions" (1). Inviting innovation is not business as usual. Although innovation and creativity can be met with some resistance, author Martin Starr says, "Innovation, which has led to new products and services, has become the business activity with the greatest clout per dollar in the last decade" (1). He feels a firm that is considering alternatives for improvement should first consider innovation.

Creativity and innovation are important for American business and how other countries view the United States. Books written by American experts on the subject of innovation and creativity are selling well in Japan. Joseph Anderson, author of "Creativity and play: A systematic approach to managing innovation" believes the Japanese feel the United States is losing its edge. He quotes Akio Morita, the founder of Sony as saying "America no longer makes things, it only takes pleasure in making profits for moving money around" (1). Morita believes the United States has

forgotten what made it strong, innovation and new ideas. The need for new innovative products is great. Anderson believes that innovation and creativity will be major management agenda items in the next ten years for the United States and Japan. In past history, the United States has been the leader in innovation. The industrial revolution of the eighteen hundreds was fueled by innovations derived from creative people. The Japanese have traditionally taken good ideas and refined them to add value. A creative idea could come from somewhere else, but they perfected it and marketed a product. This method of using others ideas is also common in the United States. John Graham, author of "Seven Keys to Innovative Thinking", feels that too many companies are content to use the ideas of others instead of developing new ones. He says, "Many firms are content to take from others without even considering that the business they happen to be taking from probably got the idea from yet another company"(1). He also goes on to say that many firms are becoming experts at copying ideas. He feels there will always be "copy cats" but the number of firms practicing this is too great. He states that: "The absence of creative thinking inhibits companies from achieving greater sales" (1). While sales can be made by copying ideas, the big increases in sales are found in companies that innovate. There is great need for ideas that make products different from competitors.

Albert Einstien once said that imagination is more important than knowledge. He felt that with imagination a person could gain more and different types of knowledge. With just knowledge, they were locked into one way of doing things (Cherry 1).

Author Kevin Cherry says, "Great scientific discoveries and innovations did not occur by understanding existing models better, instead they occurred by developing new theories, often by people who refused to accept conventional wisdom" (1). Thinking outside of conventional wisdom is an important personal trait of people who are creative.

Many authors on the subject of creativity and innovation in the business world agree on its increasing importance. It is also believed tnat innovation is only the start of a process to bring value to a business. The organization needs to have idea generators, but also needs business people to develop, mass market, and support new products. Thomas Kuczmarski, author of "The Idea Makers" states that "Ideas come rather easily but the real problem companies face is in transforming those ideas into products" (1). Innovation is not just the development of new products, but business should look to innovate when problems arise on the shop floor, sales problems and budgeting and planning strategy problems.

Many articles are written about the need for innovation for design and problem solving employees, but senior management should also be trained in creativity and innovation. This shows the management team values and understands the importance of creativity. Management also needs to develop innovative ideas to be more effective in their jobs and will also benefit from thinking past conventional wisdom (Kuczmarski 1-2).

There are many advantages for an organization to invest in creativity and innovation. According to Coates, a company that

fosters a creative environment will realize the benefits of a workforce that is more flexible and open in its thinking. The employees will be more receptive to new ideas. Coates also feels that experienced people will be able to make better use of their past experiences. It's thought that a creative environment will help experienced employees bring information from their past to help solve current problems. Coates also believes a payoff of this environment is that information and ideas flow through the organization better. Ideas will be more readily accepted if they are not so rare.

To have an organization that values creativity and innovation is essential. Joseph Gilbert says, "Companies attempting to make a profit can not continue for long periods without innovating" (2). This belief is widely held by many authors on the subject, but is not universal. J. P. Donlon, author of "Innovation: Are you Empowering?", gives examples of when innovation didn't help the company. He states that a study was done on innovation and failed to find a positive link between innovation and corporate performance. He gives examples of the Sony betamax VCR system which was widely thought of as technologically superior to VHS. VHS won in the marketplace. Another example is Apple computer's operating system, which many still feel is superior to a Windows environment. Better marketing and consumer perceptions can still override a technologically superior product innovation. There are other factors to a companys success than just innovation. Marketing, organization, and finance are as important as ideas. A point J. P. Donlon makes is, innovations can be made in marketing,

they don't always have to be product innovation (Donlon 1).

It's obvious many authors believe that creativity and innovation are the keys to increase productivity, profits and to insure longevity in business today, but there are so many fads in the business world, and each company has to try to separate fad from true innovation. George Newman, author of "A True Advance Or Merely A fad," believes "We are talking about separating costly, but basically worthless, passing fads from genuine, lasting, worthwhile innovation" (3). Companies can spend millions of dollars chasing new ideas they think will give them a competitive advantage (Newman 1).

Newman's research indicates that there is a typical pattern to how ideas get started and spread. He says that a champion of the idea starts by giving the idea a catchy name, which grows into a common business buzz word. This idea point man then presents his idea at various seminars. Newman feels the problem with this type of idea generation is the companies involved in the business aren't developing solutions to their problems. A company can adopt the idea, but it will take many years until the results are final and whether it was successful or not. By the time the results are in, the business world has moved on to something else. Newman also states that, "Excutives, seeing a trend, are afraid they are missing out on something and the internal political penalty to an individual could be greater for missing an innovation than for falling for a fad" (7). Most executives don't want to be left behind the competition, even if it means chasing a competitor down the wrong path. Newman believes another thing

that executives do is watch competitors and sometimes falsely give credit for success to a fad. Many times there are reasons for success, and focusing on or imitating just one facet could be fatal for a company.

The people producing fads are not the problem but the buyer of the ideas has to sort out the good ideas from the fad. To help distinguish fad from genuine innovation Newman devised ten questions executives must ask themselves;

1. What has invalidated the previous way of looking at the issue? Its Newman's theory that it is possible that the current way to look at an issue is the best. If there are facts that did invalidate the perspective, then it is reasonable to look for an alternative.

2. What has happened to the traditional counter arguments that would have been raised in the past about the idea? Newman states that it is important to understand the past discussions on the idea, whether positive or negative.

3. Does it involve common sense? Newman encourages executives to use common sense to try to determine if an idea will be successful over time.

4. Is it a sudden one hundred eighty degree turn? Newman feels if a perspective on an idea is totally opposite of the current perspective, there might be a flaw in it.

5. Does it invalidate all or almost all that we know about the economics of our business? Newman believes that good business judgement must still drive the decision. He feels basic rules of business, such as a customer will not pay a higher price for an

inferior product still apply.

6. If it is simple, is it perhaps too simple? Again Newman feels business people should trust their instincts. If the idea is too simple there is probably a reason nobody has tried to this point.

7. Who pushes the idea? Do they have a vested interest? Do they have a hidden agenda? Newman believes that consultants have been know to push new ideas more on their ability to sell consulting time than on the ideas own merit.

8. Do all the advocates use the same handful of examples? Newman's research on the subject has found that the same examples are sometimes mentioned. This is a red flag to distinguish between innovation and fad. If there are so few examples of this "innovation" truly working it could be a fad. If the same company is used as an example it could mean other conditions at that company were right for the idea.

9 Does it promise a ninety percent reduction or a five hundred percent increase? Newman believes business people are sometimes looking for the quick fix, when in fact there have been few quick fixes to business problems, instead most are fixed in an evolutionary method, one step at a time.

10. Has enough time passed since the first implementation to claim any results and to consider most of the evidence to be in and conclusive? Newman states that it is as big a problem to have no examples of an innovations success as it is to have limited examples. If no one has been successful then this could be a fad not a true innovation (4).

Newman states that these questions are not all inclusive but can bring up warning flags when looking to try a new idea.

Business can rarely afford to try all new ideas that are reported to revolutionize their business. They have to research and choose the innovation that has the best chance of helping them.

Current literature trends state that business can not afford to let innovation and creativity just happen. The literature also states there are many ways to achieve innovation and creativity within an organization. Two types of creativity mentioned in many articles are adaptive creativity and innovative creativity. Adaptive creativity is described as creativity used to improve an existing system or process. Innovative creativity is the process of creating something new. Charles Prather author of "Team Talent: Bringing Creative Talent on Board," feels that an organization needs both types of creativity to be successful. As with many of the authors on this subject, Prather is interested in defining and measuring creative and innovative output. Along with this, Prather developed an instrument to measure the potential ability of a person to be adaptive or innovative. The test measures originality, detail orientation, and conformance. The originality part of the test was to see if the person has "think outside the box" capabilities. The detail orientation section of the test is concerned with how efficient the person might handle details. The conformance section of the test deals with the likelihood of the person working within or outside the rules. Prather's hypothesis and reason for his study is that he feels it

takes both, adaptive and innovative creativity within a team to be successful (Prather 3-4).

Prather believes that a highly innovative type person is less likely to realize the benefits of adaptive creativity. He believes these people are more likely to throw out the old system and invent something new when that might not be the best solution. Conversely an adaptive person is likely to lose patience with an innovative person (Prather 4).

Prather believes that a team put together to solve a problem needs a diverse mixture of these type of innovators. Tests and observations of people's past performance are effective ways to determine traits that would best fit a team and gain diversity (Prather 4).

Companies and experts in the field of creativity and innovation training have tried various methods to improve the creative process. Brainstorming techniques are often mentioned in literature.

Creativity guru Alex Osborne is widely given credit for developing modern brainstorming techniques. Author Thomas Houck says, "Brainstorming sessions produce optimum results when they are divided into two different phases" (2). Houck describes the first phase as solicitation and recording of ideas without judgement or criticism. Houck goes on to say that, "In the brainstorming environment crazy ideas are encouraged" (2). An off the wall idea has been known to spark a good idea. This concept Houck calls piggybacking. Piggybacking is using an idea as a base that can be built upon. In a brainstorming session, a workable

number of ideas should be gathered. If the number of ideas gets too large, the participants will have trouble focusing. The second phase of brainstorming, Houck describes, is the judgement phase. As the name implies, participants are asked to judge the merits of each idea recorded. The focus of this phase should be positive responses to the ideas, not a steady stream of reasons why the idea will not work. Houck believes that as objections are raised, participants should look for ways to answer the objections. If the team is determined to find innovative solutions it should pursue all possible ideas (Houck 2-4).

Thomas Kiely, author of "The Idea Makers" writes about many different techniques and methods to encourage creativity and innovation. Kiely states, "In an ideal brainstorming session all thoughts are treated as welcome guests, with judgement deferred" (2). Gathering of ideas is the important first phase to brainstorming (Kiely 2).

The premise of brainstorming, as developed by Osborne, is that the different perspectives and talents of the participants will lead to the best and most innovative solution.

Many studies, including the ones performed by Osborne in the thirties and forties, have proven brainstorming to be an effective method of developing ideas. Some newer research has shown that brainstorming results are not as favorable. One problem with brainstorming is criticism. Thomas Kiely states that, "Managers so often focus on the flaws of the ideas produced by the team they lose sight of the potential" (2). The ideas will come from brainstorming sessions in various stages of completion. Some

managers believe the solutions should be complete with nothing for them to do to but implement a new idea. Kiely believes that what should happen is management should look at the ideas from the session as a starting point to further develop and implement the idea. Kiely believes that brainstorming rarely achieves its goal of a non judgmental idea. Most employees are very close to the process and have strong feelings about ideas that effect them (5).

Kiely continues to state that, "Most creativity consultants and many companies have abandoned brainstorming as ineffective" (2). Research has indicated little difference between the production of ideas by brainstorming teams or by individuals. Group uniformity pressures, or perceived threats from management will cause ideas from sessions to be skewed. Also mentioned in many articles is that the personalities within the team will effect outcome. If some team members remain silent while others dominate the conversion, the ideas might not represent a true balance. As Kiely points out, "The best ideas don't necessarily come to the loudest people" (2).

According to Kiely, some companies are moving away from brainstorming to a technique called brainwriting. Brainwriting is similar to brainstorming but ideas are written in a manner to protect the identity of the writer. The papers are exchanged and the participants then try to build on each other's insight. The loudest voices don't prevail in the discussion and there is less pressure because of rank. Kiely belives, "Brainwriting is popular among researchers who tend to judge ideas strongly; it helps them get beyond self-censorship" (2). Brainwriting sessions work very

well over a computer network where anonymity is easier (Kiely 1-4).

Another variation of the brainstorming session that has been refined, but still has some of the basics of brainstorming, is mind mapping. As Kiely describes, "Mind mapping is an organized brainstorming method" (2). Individuals draw a primary idea in the center of a paper, then depict new or related ideas as vines coming off the central picture. This leads to a more visual method of brainstorming. Boeing uses this technique to understand and present very complicated weapon systems. It is a way to condense a great deal of information into a few images (Kiely 4).

A variation to mind mapping is a technique named story boarding. According to Kiely, major companies such as General Electric, Bell Atlantic and Xerox have successfully used storyboarding. Bell Atlantic hangs large sheets of paper in a open area like a hallway or lunch room. Placed on this paper is a diagram or a problem. Employees are encouraged to write their ideas or to make changes to the diagram. The group slowly redesigns the process that is diagramed. After a period of time, the paper is taken down and analyzed (Kiely 4).

Creativity and innovation techniques are used by many companies and taught by many consultants. Another type of technique is to pattern breakers. Pattern breakers are exercises designed to stretch a persons mind and thought patterns. Kiely says, "Pattern breakers force the mind to stretch to find patterns between dissimilar concepts in hope of discovering unusual ideas in odd associations" (4). Pattern breakers work well when team

members come from different backgrounds (Kiely 4).

A class of creativity and innovation techniques called "shake-up exercises" is designed to get people to verbalize their ideas in a group. Creativity consultant Jeffery Mauzy says, "It's hard to come up with ideas and it's harder to say them, but people are less inhibited when laughing" (Kiely 4). First Chicago bank has tried a shake-up exercise by using role playing games. The bank used many different hats to define roles. At one session an employee was given a Santa Claus hat and asked to describe a proposed product from Santa Clause's perspective. The bank was trying to find out a person's ideas on a product they would use only once a year.

Another method of using hats to stimulate creative ideas is described by Alan Farnham author of "How To Nurture Creative Sparks". At a design discussion at Prudential Insurance, the living benefits life insurance concept was developed. The living benefits insurance program is where terminally ill policy holders can receive life insurance benefits before death. Participants wear different color hats. Each hat represented a different state of mind. Criticism and fault finding fall under the black hat, feelings under the red, and creative thinking under the green and so on. The person with a partiular hat has to play the part and approach the discussion from that mind set. The point of these techniques is not to design a product but to improve imagination in preparation for a business meeting. If people are relaxed they are more likely to open up with new ideas. Risk taking and not being afraid to fail or embarrass themselves is important to the

creative and innovative process (Kiely 5).

Hallmark Corporation is a company that is dependant on new and innovative ideas. Hallmark produces greeting cards, which are always changing and need upgrading to stay current with new trends. Hallmark has six hundred artists, writers, and designers. They feel this is the largest creative staff in the world. To keep fresh ideas and perspectives, Hallmark's management brings in about thirty speakers a year. The purpose of these different speakers is to stimulate creative thinking. Hallmark also believes that sometimes the best stimulus is a quiet nvironment. Alan Farnham states, "A sure fire way to stifle creativity is to demand that people always be doing things. If anyone is caught pondering, accuse them of laziness or indecision" (2). Farnham believes that employees need time to think about the stimulation. Companies make mistakes by spending large amounts of money to provide creative stimulation to their employees but they don't provide them time to think and develop their ideas (Farnham 2).

Resource deprivation is a technique used by many companies. The theory states that if sufficient resources are not available, then employees and supervisors will look for innovative ideas to accomplish tasks. There is a fine line between depriving resources to a point to stimulate innovation and where the lack of resources will prevent the job from being done. If the lack of resource is so severe, research shows employees will feel hopeless and produce less than before. Management must understand that something can not be made from nothing (Farnham 3).

The Exxon Chemical company has been a leader in innovation

and creativity training. Author Leonard Berkowitz helped Exxon develop a program to produce innovation. In his article "Wish Program for Major Innovations", he documents a Wish program developed with Exxon. Berkowitz surveyed business people to find what types of activities produced their best ideas. The results of the survey was that many activites unrelated to work like jogging, shaving, daydreaming, laying awake at night, sitting in an unrelated meeting, and driving a car is what they were doing when innovative ideas occured (Berkowitz 2).

Berkowitz describes two type of innovation, evolutionary and radical. He believes radical innovation is much more difficult to achieve. Berkowitz conducted the wish program for Exxon in the eighties to foster both types of innovation. The wish program is based on three hypotheses:

1. People who choose to work on research and development hunger for the opportunity to invent something that will fulfill important needs. Berkowitz believes these people have a strong internal desire to innovate.
2. Exposure of important needs to a large number of interested people will increase the chances for important innovation. Berkowitz feels the more people that are thinking about a problem, the more likely an innovative solution will be found.
3. By exposing needs to people who are not directly involved in the subject field, the chances for truly new, radical ideas are increased (1).

Berkowitz divided the wish program into six different categories. The first step is wish generation. The wishes

submitted by employees of Exxon were not to be targets but long sought after, never achieved goals. These wishes were to be things that, if possible, would revolutionize the employees job or Exxon as a whole. After the wishes were submitted they were edited. A panel of Exxon employees set up to review the wishes and get to a manageable number to work with. Any wish that was a previous project or nice to do but didn't make budget cuts was thrown out. The panel was looking for only new, big ideas (Berkowitz 4).

All wishes were submitted in a standard format. The wishes had to be written in terms anyone, not directly involved in the field, could understand. The next step was to disseminate the wishes to all Exxon professional staff members. Their responsibility was to read the material and prepare a reply if they had ideas on the subject. They were also asked to give their plans and resource estimates on implementing the ideas. After all the ideas from the wishes were submitted, the panel went through a selection process to determine where the most good could be done for the fewest resources. All the employees that spent time replying to the wish list received a memento and a letter of thanks from the President of Exxon. The panel used three criteria to decide which ideas to pursue further:

1. Enthusiasm of the sponsor. If the sponsor is excited it would have a better chance to be selected.

2. Novelty of the approach. A new, novel idea is given a chance to continue to see where it might end.

3. Willingness of the submitters to work on their idea. If

no one was willing to work on the idea, it was felt that it would not be acceptable to assign someone to work on an idea they didn't author (Berkowitz 5).

The final portion of the program is the seed program. This step is to make innovative ideas happen. The program was setup to allow the submitter of the idea to take full time off from their normal duties to work on the idea. Berkowitz states this approached never worked. Rarely was the employee given the proper time off to work on their idea. Instead, they worked on the ideas part time, wherever their regular job allowed. Often, the submitter needed help and could not make progress on the project by themselves. These seed programs were funded by each department paying into a "wish kitty" (Berkowitz 5).

Berkowitz found the results to be mixed. Six wishes were followed up on. The needs changed on two of the projects so the work was dropped. He felt most of the failure was do to lack of commitment on the part of the submitter and the company. Four projects were pursued, with poor results. Exxon spent approximately $800,000 on a project that lasted three years. Berkowitz felt there were no tangible results, but there were still some important benefits. The employees realized the company was serious about innovation and considered it a high priority (Berkowitz 5).

There are many techniques and programs employed by companies to improve creativity and increase innovation. Another area that experts have written about is qualities and thought processes that individuals can use to improve their personal creativity and

eventually learn to innovate. John Graham, author of "Seven Keys To Innovative Thinking", lists seven ideas an employee can use to become more creative and produce innovations. Graham describes pushing the envelope as not playing it safe but taking on some risk. Graham states, "It takes guts to get attention today" (1). He feels that in order for business to be competitive, they have to push the envelope by offering innovative guarantees and other programs that will get customers attention. Thinking about things that are unthinkable is a way Graham thinks people can get a jump on creativity. The longer a problem is studied the more likely a solution will be found. He feels business should think of what the company would be if the economy changed. Their customers could change which would cause a shift of goals and values of the company. Graham believes every company should have at least one person who takes an opinion that is against the popular view. Many times the innovative solution comes from the opposite view. Graham states, "There is no place for timidity" (1). He feels common prejudices, old schools of thought and people who safely follow them are not what business need today. People who will speak up, challenge ideas, and share new thoughts will improve a person's creativity and innovation (Graham 1-4).

Ted Pollock, author of "Mind Your Own Business", also feels that people need to improve their personal creativity and innovation. He states, "The best way to get ideas and solve problems is to invite sight" (1). Pollock believes that different things work to provide personal innovation for different people. Pollock writes that one of many specific strategies to induce

creativity will allow employees to improve their innovation (Pollock 1).

The use of analogies is an effective method to increase personal creativity, according to Pollock. Compare business problems to natural phenomena, like when radar was developed by using sound waves similar to bats. The idea is to associate two unrelated things to solve a problem (Pollard 2).

Pollock believes that there is a proper way and a wrong way to ask a question. Instead of asking questions that can be answered with a fact, Pollock says answers should require analysis and explanations to delve deeper into a problem. Pollard believes people need to think in terms of many possibilities and how things might be done. There are usually possibilities to accomplish things differently. Bringing these different solutions to the to employees attention is the goal (Pollard 3).

Reading articles is a method to get and associate ideas. The problem with reading for many busy business people is the time it takes read large volumes of paper. Pollock suggests there is a difference in reading to acquire information and reading to generate ideas. He feels scanning articles to generate ideas is a less time consuming form of reading. Pollard feels this is a skill learned by practice. Once the skill of scanning articles for ideas is learned, Pollard believes the skill should be used for studying the innovation process. There is much written about innovation including examples of what other companies are doing to improve in this area (Pollard 3).

Selfish listening is another technique described by Pollock

used to gather information. He suggests listening carefully to others and continually asking yourself how you can use the information to your advantage. Pollard says this method should be used in conjunction with asking provocative questions. If probing questions are asked, then intent listening will be effective for gathering information.

Improving creativity should include being receptive to the unexpected. Pollock states, "Realize how old items of information can often be used in new ways by adding some quality to them" (2). He suggests that no idea be dismissed without much thought. Another trap people fall into is thinking there is only one right answer to a problem. Pollock writes that it is dangerous to jump on the first solution that seems correct. He states that people should be demanding of themselves and keep looking for an innovative solution until they are convinced they can do no better. Many times the person will be surprised with the solution to the problem when more effort is expended (Pollard 4).

James Higgins, author of "Innovate or Evaporate", believes business must strive to innovate in many areas of their organization. He states: "The secret to competitive advantage is innovation" (1). Higgins believes an organization must foster a culture of creativity, then turn the creativity into innovation that can be used to increase the value of the business.

Higgins studied organizations that are very successful in innovating. One thing he found common to the organizations is that they all had a stated strategy of innovation. Higgins stated that this strategy was not a policy that wasn't used in their

everyday work, but a working strategy. An example used by Huggins is that of Super Bakery. Super Bakery cut their costs by 2% per year for the last five years. They incorporated a plan to stress innovation to all their employees. Employee suggestions have made many job process easier (Huggins 2-4).

Another common trait of successful companies studied by Huggins was the forming of teams. Huggins feels very focused teams, to work on very specific problems, is a method to foster innovation. He gives examples of companies using "tiger teams". Tiger teams are groups with members from different areas that are given specific tasks. The tiger teams are allowed to break usual rules to reduce product development time (Huggins 3).

An important part of fostering innovation Huggins believes, is to reward creativity and innovation. In the past, many thought the reward for innovation was the work itself, but this thought is changing. Higgins states, "Corporations have discovered that their professional innovators are also very receptive to financial rewards" (3). The 3M company has it's own version of the Nobel Prize for it's employees. Several of these prizes are given out each year to employees whose ideas have had a significant impact to the company. Also, as a reward for innovation some companies have created an innovation track to allow for promotion without having to move to management. This allows creative people to advance in the company without having to be a competent manager.

Higgins believes companies successful in innovation will have a culture of allowing mistakes. Huggins states that the CEO of Johnson And Johnson failed in the first major product he was

responsible for launching. When the product failed, the chairman of Johnson And Johnson called to congratulate everyone associated with the product for taking the risk. Huggins feels this is an important lesson for companies to learn. The people who took the risk will not be intimidated next time an idea is pursued (Huggins 3).

Many companies are currently training in innovation as a method to gain a competitive advantage. Huggins states that Dupont trains their employees in five different techniques: lateral thinking, metaphoric thinking, positive thinking, association triggering, and interpreting dreams. These techniques have proven to be worth the training investment, according to Dupont. Higgins states, "Various groups of employees respond to certain processes better than others" (3). Research has indicated that a combination of innovation techniques like these is effective for many kinds of employees (Huggins 3).

The culture of an organization has a lot to do with the innovation and creativity produced. Some organizations like Microsoft, have a culture of empowerment that is passed on to new employees. Microsoft has designed its facilities to encourage the innovation process. All offices have windows and the buildings are laid out like a college campus. Microsoft's founder, Bill Gates believes these things will promote creativity and innovation. He also feels creativity and innovation is the reason Microsoft has stayed the market leader in its industry. Because of innovation, Microsoft has increased productivity per person every year. Companies like Microsoft have top management's commitment to

innovation. Eric Kessler, author of "Managing The Uncertainties of Innovation", says "Management is less likely to try to direct the innovation process in it's details than to legitimatize and guide it by indicating which product innovation opportunities should be pursued" (7). Management's role in the innovation process is setting an organizational culture that consistently produces ideas. Management deals with appropriating resources to a selective group of ideas and deciding which ideas should be pursued (Kessler 3).

Much has been written about successful companies. These success stories further prove the necessity of creativity and innovation in organizations. Kevin Cherry, author of "Reengineering: Harnessing Creativity and Innovation", writes about some major companies that have succeed by committing to innovation and creativity. Johnson & and Johnson CEO is quoted by Cherry, "Any successful growth company is riddled with failure, and you have to sometimes lose to win" (6). Johnson & Johnson has successfully established a culture where risk is rewarded. Johnson & Johnson is a highly regarded company credited with introducing or improving many successful products every year. Cherry goes on to use Lincoln Electric as an example of constant improvement. The corporate culture at Lincoln values better performance in all areas of the business. Lincoln feels using dedicated teams to attack problems and innovation is a major reason for it's success. Similary, Cummings Engines reduced its costs by forty percent and improved the quality of its engines. This was accomplished by a new focus on innovation and creativity

in all processes of the company (Cherry 2).

There are advantages of incorporating innovation and creativity training into an organization. Many writers state the importance of innovation to a company but, some express caution in chasing too many ideas. There are many techniques to develop creativity and innovation. This study will research which of these methods has proven to be the most effective by companies when implementing innovation into their organizations.

Chapter III

SELECTIVE REVIEW AND EVALUATION OF RESEARCH

Many of the authors on the subject of creativity and innovation in the work place agree that these areas provide advantages that businesses need in a competitive environment. The current market pressure is to do more, provide more service and better products at reduced costs. There is also strong pressure to produce new and innovative products. Much of the literature reviewed stated that creativity and innovation did improve productivity.

Improved productivity is measured in many ways. Many of the authors use sales figures to compare the results of different innovations. When adding an enhancement or improvement to an existing product, it is more accurate to measure the before and after sales figures. If the enhancement greatly increased sales, the value of that innovation is evident. Each business needs to decide if the research and development of creative ideas is economically beneficial.

In a more broad sense, the value of innovation and creativity could be measured by economic growth of the business. Gavin Cameron author of "Innovation and Economic Growth" states, "There can be no single measure of the output of the innovation

process" (2). Cameron believes that the first problem to measuring the value added to business by innovation is determining that innovation has occurred and where in the organization it did occur. Cameron uses indicators such as research and development spending, patenting, machinery purchases, and technological advances to tell if a company has invested in innovation. Research and development spending is commonly used to measure technical change. Research and development numbers have been the easiest to get. They usually are included in companies' annual reports. Other items used to measure innovation are patents and "technical spill overs". Technical spillovers are described as technical innovations that a company uses from their competitors (4).

Cameron states, "Technical spill overs reduce the innovation costs of rival firms because of knowledge leaks, imperfect patents, and movement of labor" (Cameron 2). Rival firms sometimes make a practice of hiring employees from competing companies to gain their knowledge. The hiring firm gets the benefits of innovation without the expense of developing the idea. This will sometimes misrepresent the benefits of innovation versus the costs.

Cameron's study looked at research conducted in 1957 by Solow. Solow's research contended that much of a company's economic growth is derived from innovation. Solow felt about 87% of growth was due to innovation. Later studies researched by Cameron indicated while still substantial, other authors felt only about one third of economic growth was attributable to innovation.

Cameron believes problems with earlier studies include, while showing that innovation is important to growth, fail to shed light on what causes the innovation to spur the economic growth. There are many variables in the study of economic growth. Some factors that effect economic growth both positively and negatively are public infrastructure, new equipment, or changes in the general workforce. An absence or increase in skilled labor can effect the economic growth and not have anything to do with innovation for example.

The percent a company spends on their research and development is positively correlated to economic growth in Cameron's study. Cameron states that a 1% increase in research and development spending will lead to a rise in the economic growth of the company by .1%. In most firms this is a very good return for their resources spent, while their spending for research and development is much less than their overall yearly economic growth. Another method used by Cameron to measure economic growth is to measure the percentage of spending on research and development versus the total expenses of the company. He found that the more spent on research and development the more the rate of economic growth improved. These figures tended to be more accurate when looking at an industry instead of a specific company. Individual companys' movement in economic growth did not always perform as expected, but industries seem to perform according to the model. Cameron believes this is caused by "innovation spillovers". Innovation spillovers are similar to technical spillovers but, can include innovations in marketing or

other services.

The returns of research and development and innovation varied significantly between industries. Research intensive industries described by Cameron as industries like chemical, and bio-medical showed large gains in economic growth by increasing research and development. Also apparent in the study by industry is the effects of "knowledge spillover". The benefits of innovation tend to improve the economic growth of the whole industry. Not only does the company with the innovation gain most, but others in the industry also gain. Cameron credits industry literature, personal contact, and common consultants for these findings in his research. Consultants within an industry tend to share a company's ideas and strategies within an industry. This is another type of spillover that makes measuring innovation difficult (Cameron 4).

Other factors are also used to test the effect of innovation on economic growth. Cameron states, "Patenting by United States firms and imports of machinery from abroad have a significant and positive effect on productivity (5). In many studies patenting is closely associated with innovation. A number of studies have looked at innovation and productivity at the firm level. Looking at one company can focus on one particular innovation. The problem with these types of studies is the impact of one innovation. The impact could be huge or very small. If looking at the results of a company with a substantial innovation that did not cost large amounts of research and development dollars, the benefits of that innovation could be distorted.

A number of researchers have looked at the relationship between innovation and profitability. According to Cameron, "It is difficult to establish a link between innovation and profitability, mainly because the variety of factors affecting profits is greater than that affecting productivity" (Cameron 6). One common factor in the studies is that innovative companys have higher profitability in periods of economy down turns. Cameron states, "Innovative firms had higher profit margins and were less sensitive to down turns than non-innovative firms" (6). During normal economic times, profit margins are more difficult to tie to innovations.

Patenting records give clues to which companies are providing innovation. Research has shown that companys who are not applying for patents are still benefiting from the innovations of others. This is described as "spillover" by Cameron. Cameron's research focused on how quickly a new product or innovation became known to rivals. The research indicated that rival companies had full knowledge of innovations within twelve months. Cameron states, "Once the innovation has been developed, information concerning its operation is quickly known to its rivals" (8). Approximately sixty percent of innovations were copied within four years. This "spillover " is partly why it is difficult to measure the effects of innovation on profits. A company that spends on research and development will profit from innovation, but other companies will also benefit from that innovation without investing the money in research and development. In this case both companies made profits, with the inventing company having the most substantial

financial outlay for the development of the innovation. Cameron also suggests that idea spillovers do not happen as often internationally. These spillovers tend to happen locally more often than when great distances are involved.

Cameron lists various studies in Table 1, that estimate the rate of return for research and development spending.

Table 1 (United States)

Study	Direct Rate of Return	Indirect rate of return
Minasiam(1969)	54%	
Griliches(1973)	23%	
Terlecky(1974)	12%	45%
Link(1978)	19%	25%
Griliches(1980)	27%	
Mansfield(1980)	28%	
Terlecky(1980)	14%	183%
Link(1981)	0%	
Schankerman(1981)	24%	
Sveikausas(1981)	7%	50%
Scherer(1982)	29%	64%
Griliches(1983)	19%	
Link(1983)	5%	
Clark(1984)	18%	
Griliches(1984)	3%	
Griliches(1986)	33%	
Jaffe(1986)	25%	
Schankerman(1986)	10%	
Wolf(1987)	11%	

Berstine(1988)	27%	
Nadiri(1989)	9%	11%
Berstine(1994)	68%	

Cameron, by researching these other studies postulates that the rate of return varies for research and development dollars spent, but there was considerable return for innovations. The indirect rate of return is described as value added to the business not directly measured by increased sales figures. These studies looked at various companies spending on research and development and tried to measure the increased value the company derived from the innovation. Cameron found a relationship between the geographical proximity of companies and innovation. The conclusion of this is companies keep a close eye on their competitors especially the ones in their geographical area. While "borrowing" ideas form the competition happens, it will alter the studies; in that, the value for the innovation could be overstated or understated. If the developing company spends most of the dollars to develop an innovation, its rate of return will be lower. If the company that borrows the idea for an innovation with very little spent on development, then the rate of return could be overstated. Also, in the studies Cameron found that companies who traded with other business outside their geographic area had more success in innovation. He suggests that these companies learn from each other in the process of doing business. Cameron states "A consensus has emerged that, whether measured by research and development spending, patenting, or innovation counts, innovation has a significant effect on productivity" (10).

Innovation is an important part of business growth and many innovative ideas and products are developed by creative people. Some studies have focused on methods to promote and increase the instances of creativity leading to innovation. Author Christina Shalley examined the effects that three variables have on creativity. The three variables Shalley uses to study their effects on creativity are working with someone else, expected evaluation, and goal setting. Shalley states "Creativite behavior is defined as behavior that results in identifying original and better ways to accomplish a process" (1). Creative behavior is developing solutions to business related problems. Much of the research suggests that some conditions are necessary for creative behavior. For a person to maximize their creative ability, they need ability, motivation, and cognitive activities. Ability to reason and understand the business problems that they are trying to solve is important. Being motivated to solve the problems with some reward at the conclusion is an necessary part of the process. Cognitive activities are described as developing skills and exercises to promote creative thinking. Shalley states, "Creative ability involves combining previously unrelated facts and ideas in such a way that new ones emerge" (2).

In Shalley's study, she feels creativity can be enhanced by creativity training, but only deals with the effect of social factors. Factors such as motivation were tested in the study. Intrinsic motivation is an self directed interest in the task that needs to be accomplished. The individual must be interested in providing a solution. Since creativity and the resulting

innovation take a lot of mental effort, the person must be motivated to work hard. Research has found that research and development professionals believe motivation is necessary for creativity (Shalley 1-2).

Engaging in cognitive activities such as problem definition data gathering, and generation of ideas is necessary for creative responses to emerge. This is a method for all of an individuals attention to be focused on all relevant issues. With a strong focus, it is thought creativity can be activated. Shalley states "To be creative, individuals must search knowledge states to find a sequence of operations that will achieve the desired responses" (2). If the cognitive processing is disrupted, creativity will suffer and critical information will not be used in the problem solving. Prior research indicated that variables such as goal setting, rewards, and choice of work procedures can effect creativity.

The first area to be researched is the effect of co-workers on creativity. Previous studies have concluded that the presence of a co-worker would distract the individual, therefore reducing creativity. Some studies have broken the tasks down into two types, complex and more simple. Shalley's hypothesis was that co-workers working together will harm creativity on complex tasks, but will improve creativity on more simple tasks. She also felt that workers working alone on highly complex tasks would be more creative.

Previous studies done on this subject have been inconclusive. According to the Baron 1986 study, the presence of others can

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either energize or distract people and disrupt their performance. The performance depended on whether the participants were focused on their tasks, therefore harder to distract. When the participants were not focused the co-workers led to distraction.

Shalley expected to find different results. First, Shalley believed that workers working alone on a poorly planed project will have higher levels of creativity than working in groups. The method Shalley used in the study was to set up two groups, one working individually, the other working in a group. She recruited eighty-four undergraduate students in an organizational behavior course to participate. The average age was twenty two years old. Sixty three percent of the subjects were men. The subjects were randomly assigned to each group. The methods Shalley used are subject to questioning. While depending on focusing on the task as a key part to determining if workers are more creative working alone or with others it might have been better to get more of a variety of ages involved in the study. There could be a variable in the ages as they pertain to performance. Younger subjects could tend to be more creative either individually or in groups. This could be different for different age groups. Although Shalley seemed to get good diversity between male and female respondents she picked similar types of people. The subjects were part of a organizational behavior course. It could also be questioned that this type of course attracts similar types of students. These students could have similar traits in creativity and problem solving. As with the ages, there should be a more diverse backround group.

The subjects in the creativity tests were given instructions and a set of tasks. These tasks were human relations problems. All groups were asked to be as creative as possible in solving the problems. Each group was asked to complete as many of the problems as they could. The subjects either worked alone in private conference rooms or in bigger rooms working in sets of five. At the end of task the subjects were asked to fill out questionnaires. There were judges assigned to measured the creativity of the groups. Productivity was also measured along with creativity. Each group was given twenty-two different human resource problems. To judge the productivity each group completed projects were counted.

Creativity scores ranged from 2.14 to 4.51 with a mean of 3.16. The standard deviation was .047. The judges rated the overall creativity of the solutions found. The scale of one was not creative at all, with seven being very creative. The creativity scores were an average of the creativity ratings for each individual. The average creativity score while working alone was 3.29. The average creativity score while working with others was 3.03. Shalley concluded there would be slightly more creativity used in problem solving by people working alone than in groups. The study concluded that with the projects assigned and the requests made of the subjects to be creative, people were more creative working alone. The results could be different with different types of projects. The projects given were of the same complexity. Some authors believe that the more complex the project the more the need for others to stimulate the creative

process. Also Shalley used randomly assigned teams with each participant not bringing any special skill to the team. In a real business, team members are chosen for the diversity they can bring to group. Many times a team is made up of members from different departments. For example, a marketing focus and a research and development focus is needed to get the maximum creativity for problem solving.

In a second part of Shalley's study, she tried to measure the effect of creativity as not being a goal of solving the problems. The first part of the study the participants were told to be as creative as possible. The second part of the study the participants were told to solve the problems as a first priority. Nothing was said about creativity.

The methods used by Shalley were participants working alone and in groups. One hundred and thirty six graduate students participated in the study. Like the first study, the average age of the people in the study was twenty-two years old.

Standardized instructions were given explaining each task to be performed. They were told they could spend as much time as they wanted on the projects, and did not have to finish any set number of projects. They could also provide more than one solution to any problem. The total time given was thirty minutes. The subjects either worked alone or seated at a conference table working with four or five others. Creativity was measured by the same method as in part one of the study. Judges graded solutions from one to seven.

The scores ranged from 1.3 to 4.0. The mean creativity score

was 2.31. These scores were lower when no creativity was expected than when creativity was expected and part of the instructions. Participants who worked alone with creative expectations had higher creativity ratings in part one, and in part two, subjects who worked alone also had higher creativity scores. The subjects who had creative expectations and worked alone had the highest scores of both studies. The subjects who worked in groups and had creative expectations scored higher than subjects working alone without creative expectations.

Shalley's results showed that the highest creativity scores were from creative expectations and working alone and the lowest scores were from not creative expectations working with others. Shalley states, "Perhaps individuals in these conditions, who knew what was expected of them on the task and were free from external distractions directed all of their attention toward generating a novel and appropriate response" (12). This leads to conclusions of other authors that employees need time to think and experiment to be creative. Also, Shalley's study suggests that the expectation of creativity plays a role in the process. Shalley believes that the lowest scores were a result of no creativity goal and the distractions of working with others. A creativity goal seemed to focus and refocus the subjects on the problems. Although the creativity scores increased with the creativity goal, the productivity decreased. Shalley measured productivity as the number of problems solved by the subjects. The subjects with the creativity goal finished fewer problems, but did so with more novel solutions. Shalley's assumption on the results were that

setting performance direction and goals is effective as long as they are set for all dimensions of the problem. She encouraged creative solutions or problem solving, but not both.

In the study, Shalley received results she did not expect. The productivity (the number of problems solved) was higher for the subjects who worked in groups. Other studies hypothesized that the productivity in groups would decline because of distractions of others. Shalley hypothesized that the reason for the increased productivity was that many ideas and perspectives came together to solve problems. The solutions were not as creative but a lot of work got done. The presence of others provided an increase in problem solving drive and an urge to complete the tasks. The tasks were not complex and the groups were able to provide simple solutions. Shalley hypothesizes that if the solutions required more complex solutions, the groups would not have been as successful. If the groups were chosen by areas of expertise instead of randomly the results might have been different (Shalley 10-15).

In summary, Shalley's study brings out some interesting points. There is a relationship between productivity and creativity. Shalley's study suggests that creativity could hurt productivity. What wasn't measured in this study was the creative solutions helping solve more or different problems in the future. Solutions have to be judged over a period of time. In the short term it might be wise for a business to use normal, highly productive solutions without regard for creativity. In the long term a business might be better served by finding creative

solutions that could help solve problems in the future or eliminate those types of problems.

The creative solutions that were arrived at should also be studied to see if there is potential value outside of just solving the current problem. It is possible that the creative solutions were of no more use than the normal solutions.

The true measurement of creativity and the innovations that can be produced for a business is the value the business derives from that innovation. Various studies show how to encourage creativity which is the forerunner of innovation. It is important for businesses to create the proper environment for creativity and innovation to prosper, but it is equally important for the business to focus the creativity in ways that they will gain value for the business. Creativity and innovation comes with a price, but each business must evaluate whether that price is worth the costs. They must also determine if they are not willing to create and innovate if costs associated with that are acceptable.

Chapter IV

RESULTS

Innovation and creativity can be measured in different ways. The results will vary depending on the variables used in the research. To study different aspects of innovation and creativity and their value to businesses, researchers tried to determine which variables effected innovation and creativity. Author Christina Shalley believes that there are three conditions that have to be present for creative behavior. Shalley states "The three conditions of creative behavior in the workplace are intrinsic motivation, certain cognitive activities and ability" (2).

Ability is described as knowledge of the area in which the individual is working and the skills necessary to be effective in that area. In Shalley's study she attempted to measure ability by a random sample of subjects. Creative ability has been shown to be enhanced through creativity training.

Shalley describes intrinsic motivation as an inner driven desire to complete a task. Shalley believes creativity requires individuals to have both, interest in the task and motivation to find a solution. She also believes any distraction that causes a loss of focus on the task will cause a decrease in creativity.

The third factor needed for creativity and innovation is cognitive activities. Shalley states "Certian cognitive activities, such as problem definition, environment scanning, data gathering, and generation of alternatives, are necessary for creative responses" (3). If these areas are disrupted or left out of the process, creativity will suffer because crucial information will not be thought of or used. Prior research has found that variables like goal setting, rewards, and choice of direction in work procedures can affect creativity. These variables were studied because of their presence in organizations in the United States.

Goal setting, as an example, is widely used in business today. Much of the past research did not study the effects of creativity goals on creativity or productivity. A creativity goal is a goal to solve a problem creatively not just to solve the problem. Shalley's study tried to determined if the creative process actually slowed down production. In the short term it could be possible that the more creative the solution, the more time it will take to solve the problem. A balance of creativity and productivity has to be reached. The number of tasks completed was measured to determine productivity. Shalley attempted to study creativity and productivity in relationship to other variables.

Other variables in the study that effect creativity and productivity were the presence of others and external evaluation. The presence of others variable measured subjects working alone or in the presence of others. Certain tasks have proven to be

accomplished more efficiently by working with others, while other tasks are accomplished better working alone. Previous studies have determined more complex tasks are better accomplished by working alone, for less complex tasks it is better to work with others.

Expected evaluation of creative results was a covariable in the studies. Shalley tried to determine if the subjects were expected to produce a creative solution, would that expectation have any effect on the results. As the scores have shown, the expected evaluation produced higher creativity scores.

Gender was also used as a variable in the studies. It was hypothesized that gender could change the results of the studies. The effort to determine if gender has an effect on men's or women's performance was insignificant. There was no noticeable change in the scores of men or women.

The following is a summary of analysis for creativity and productivity in studies one and two.

Variable	df	Mean Square	F
Study 1			
Creativity			
Presence of others	1	1.60	7.58
External evaluation	1	0.00	0.01
Others & evaluation	1	0.01	0.04
Errors	80	0.21	0.22
Productivity			
Presences of others	1	6.15	0.43

External evaluation	1	99.70	6.97
Others & evaluations	1	56.32	3.94
Error	80	14.30	
Variable	df	Mean Square	f
Study 2			
Creativity			
Presence of others	1	0.06	0.10
External evaluation	1	0.17	0.27
Creativity goal	1	7.53	12.33
Others & evaluation	1	0.34	0.56
Evaluation & goal	1	0.43	0.71
Others & goal	1	0.12	0.20
Others & goal & expectation	1	4.21	6.88
Error	128	0.61	
Productivity			
Presences of others	1	90.52	12.67
External evaluation	1	10.52	1.44
Creativity goal	1	27.16	3.80
Others & evaluation	1	6.77	0.95
Evaluation & goal	1	2.66	0.37
Others & goal	1	2.01	0.28
Others & evaluation & goal	1	3.55	0.50
Error	128	2.55	

The correlation between productivity and creativity is -.06. This means productivity did go up when creativity went down. This should be viewed in context and not be construed that all creativity hurts production. Shalley and other authors researched stated that creativity and the innovation that follows is necessary for business to grow and gain value in the long term. An important idea of this study is that it may take more resources to complete tasks with a creative solution, but to make major innovations, management must be patient and invest in creative solutions, including giving employees time to innovate.

The study also showed a significant effect of evaluation. If the subjects knew they were getting evaluated for results and creativity, they completed fewer tasks. Significantly more tasks were completed when a creative solution was not expected. There was no significant effect by the presence of others. Subjects who worked alone with no creative expectation had the highest productivity. The subjects who had expectations of creativity and worked with others, had the lowest productivity scores.

The following table summarizes, from the second study that Shalley under took, the mean and standard deviation of two major categories. The categories of creativity and productivity are compared when no evaluation, and evaluation were the variables. An overall score was also calculated. Individual statistics of mean and standard deviation were calculated on subjects working alone, with others and overall. A major difference between study one and study two was study one subjects were given creativity and production focuses but not actual goals. In study two, there

were specific creative and production goals. Shalley describes a goal as an accepted and internalized assignment (8).

Experimental Condition	Alone	Co-Action	Overall
Creativity			
No Evaluation			
Mean	3.29	3.03	3.16
Standard deviation	0.41	0.43	0.47
Evaluation			
Mean	3.32	3.02	3.16
Standard deviation	0.53	0.46	0.52
Overall			
Mean	3.30	3.03	
Standard deviation	0.47	0.44	
Productivity			
No evaluation			
Mean	11.86	10.76	11.31
Standard deviation	5.23	3.28	4.35
Evaluation			
Mean	8.00	10.18	9.14
Standard deviation	3.39	2.79	3.24
Overall			
Mean	9.98	10.47	
Standard deviation	4.79	3.02	

It appears that a goal is different from a "focus". The subjects were asked to be both creative and productive. It is unclear how the goal effected the creative process or

productivity. In study one, expected evaluation had little effect on creativity. In study two, expected evaluation was beneficial in certain situations. The results of both studies is that expected evaluation is not harmful to creativity. It might not help in all situations, but it probably doesn't hurt. Also, both studies suggest that working alone can, in certain situations, be more conducive to obtaining creative results than working in teams. A possible theory of improved creativity by working alone is the lack of distraction from others or pursing co-workers ideas. Some people are less likely to present their ideas in a group. In these cases, the results are from the people with the strongest personalities.

Both studies presented detailed information on creative problem solving. The results showed that management must set environments that allow people to become as creative and productive as possible. Depending on the task and the type of person, the creative environment could vary.

Chapter V

SUMMARY

Innovation and creativity are hot topics among business people today. Consulting firms are focusing on their businesses by providing lectures and methodologies to improve innovation and creativity. Many authors have written about innovation and creativity. Author Martin Starr states, "Innovation, which has led to new products, process, and services, has become the business activity with the greatest clout per dollar in the last decade" (1). Most agree there is much to gain from a company's investment in this process, but some disagree on how to accomplish the goal. The goal of business people in this area is to develop new ideas which lead to product innovation, an improvement in service, or in their operation, and to separate themselves from the competition.

Author Thomas Kiely states, "Creativity is only the first step, the real goal is innovation" (1). Innovation is a result of a new creative idea that approaches a problem in a new and different way. Innovation has been described as a physical manifestation of creativity. The interest in the innovation revolution is fueled by current economic trends. Current trends in business is to do more and provide more to customers for less

costs. Increased competition demands that businesses look, and work harder to gain an edge.

The largest, most powerful resource in business today is the work force. There are two main areas of study for improving creativity and innovation in the work force. Programs to systematically entice new ideas, and studies to learn how creativity and innovation evolve.

The culture of an organization has much to do with the creative atmosphere of a business. Management values will be ingrained into the culture of an organization. Employees need to have management support and be given time to create and innovate. Christina Shalley conducted a research study on the effects of co-action, expected evaluation, and goal setting on creativity and productivity. Part of her finding was that subjects asked to find a creative solution actually had less short term productivity. This is a real issue for management to retain short term productivity. While most of the research and management opinion agrees that creative and innovative behavior needs to take place to keep pace or out distance the competition, management will have to learn to live with a productivity loss in some cases. The drop in productivity is probably temporary. In the longer term, the price of innovation will be paid back many times over.

Organizational culture also has a great effect on innovation to the amount of risk employees feel comfortable taking. This is another concept that management must deal with. Managers must accept educated risk that could result in some failures. How an organization reacts to a failed innovation will set the stage for

future creative and innovative endeavors. If employees are disciplined for failures, they will be less likely to assume any risk in the future. Allowing risk to improve innovation and creativity is one method to let employees feel secure. Another way to encourage risk is to reward for risk. This is a major paradigm shift for businesses. In this environment, businesses will need to reward employees for failures. This will put more pressure on management and supervisors. Risks should be taken only after proper research and investigation. The management challenge is to create an organizational atmosphere where the guidelines of what is acceptable risks are clear to everyone. James Holland, professor of computer science at the University of Michigan states, "Unless you are failing at least four out of five times, you are not trying hard enough to do new things" (Donlon 1). The organizational culture should be considered safe for risks and for developing new ideas. Failure should be seen as a learning experience. Ideas that fail are successful in teaching what will not work. Employees have the need to express their ideas without fear of belittlement.

Many studies suggest that working with and managing people who tend to be creative and innovative is different than working with most employees. The people who tend to be more creative generally enjoy risk taking and are more independent. Studies conducted by the Exxon corporation showed that people who worked successfully in research and development had a desire to invent something that will fulfill an important need. Author Alan Farnham states, "Creative people are not necessary the best

educated or the brightest but, they are self motivated, love risk, thrive on ambiguity, and delight in novelty, twists, and reversals" (1). When setting up a creative team, managers have the charge to find the people who have these type of traits. Managers and supervisors have to do two things in realizing that creativity and innovation are a necessary part of future business environment.

Managers have to hire and retain employees with these type of characteristics. To attract and retain people with creative abilities, it takes different incentives than other employees. Where other employees might be more interested in job security and pay, a creative person might be more interested in the work environment and the corporate culture. Creative people are very interested in increased training programs and freedom of expression. Training in new technologies necessary. Technology is considered an enabler of innovation. New technologies, which are a new way to approach a problem, promote new innovative solutions that were not available before the technology break through. Creative people have a strong need for freedom. Freedom in what and how the work is to be accomplished. Studies by Joseph Coates suggest creative employees need more encouragement than others. While things like money and job security are important, creative people like to be recognized for developing something. With recognition they need support and enthusiasm from management. They also work best when they are free from criticism. Resources have to be adequate for someone to create and innovate. Enough time to solve problems and access to

information is also necessary. This is in conflict because other authors believe that resource depravation is an effective method to promote creativity. With less than ideal resources, some believe innovation can be forced. Although some companies intentionally try to deprive resources, many do this out of necessity. Manager's at many companies do not have enough labor or financial resources they feel they need to do the jobs they are assigned. These managers are forced to use the resource depravation method.

Feedback on a creative person's work is also important. There are studies that suggest that creative people require a lot of feedback, and want to know they are doing something useful.

There are three types of challenges that excite creative people. The nature of the problem, outside competition, and time urgency are challenging to creative people. This might be the most important part of keeping creative employees satisfied. Various studies have suggested that a challenge, solving a long standing problem, is a creative person's greatest reward. With that challenge, there also has to be the appropriate rewards. The rewards are for recognition, as not to give the appearance of taking advantage of the employee. The absence of a reward could cause hard feelings, mainly from the lack of recognition. Coates believes that creative people need to constantly be refocused. They will have the tendency to drift to other pursuits.

There are factors that inhibit creativity in an organization. Interaction between departments can cause a "protect your turf" attitude. Frequently, departments view their organization's goals

differently. Goals for the company need to be clear to all departments. Companies should avoid the role of the devil's advocate. This role is designed to find things wrong. In a free creative environment, ideas should be approached by what is "right" with the idea.

A different approach to creative training is that not everyone is capable of producing creative results. Many programs designed to increase innovation are geared to all employees. The point of these programs is to open the creative process to as many employees as possible and see what new ideas fall out. This approach seems to be inefficient and somewhat ineffective. Studies have shown some people do not have the ability to be creative. Management should take the time and effort to screen who has an ability for innovation. Many employees who have no ability for innovation and creativity will be wasting time in the program. Not only will these employees be wasting their, time they will also be slowing the creative process for employees with the aptitude for this type of program.

Companies can spend a great deal of money and other resources implementing an innovation and creativity program it is important to get the most for the money. In an organization where an effort is made to keep everyone happy and give all employees the same opportunities, the singling out of individuals for special projects will cause problems. Companies need to come to the realization that not everyone will be successful in these environments. Hard decisions need to made on how to spend resources on creativity programs. Offering more money for

creative ideas sometimes works. It can also back fire. More money can be perceived as the company gaining more control of the person. Generally, a creative person will avoid being controlled and will thrive in environments where they have more control over their work. Overall, the methods of trying to achieve creativity and innovation are more important that any one accomplishment. The proper methods and environment can continue to produce results for many years.

In many of the research studies and related articles for developing creative ideas and innovative solutions, the role of managers and supervisors continue to be vitally important. Management has to lead the charge in these areas. Employees have to see the commitment from all levels of management. Many times there is a commitment from top management, but the commitment fades with lower level managers. These lower managers sometimes feel the extra time the creativity process needs takes away from the normal operational tasks that need to be completed everyday.

Various authors studied have discussed keys for stimulating new creative ideas. The following is summary of some keys to stimulating ideas.

1. The use of analogies have proved to be successful in stimulating new business ideas. Associating current products or technology with new problems is using analogies.
2. Asking provocative, open ended questions are a method to get employees to think in different ways. Avoid questions that can be answered with a yes or no.
3. Think in terms of possibilities. Ask "what if?' questions

when trying to solve a problem. Also ask what innovation would have the biggest impact to the business.

4. Reward original thinking. Provide an environment where original thinking is tolerated but actually rewarded.

5. Become a creative reader. Learn the difference between reading for information or pleasure and reading to generate ideas.

6. Learn to listen. When listening, always consider how you can use the information.

7. Study the process of innovation. Learn how innovations come about. Develop skills in associative thinking.

8. Be receptive to the unexpected. Realize how old information can be used in new problem solving. Something can be unrelated, but with some modification it can be used to help solve a current problem.

9. Don't fall into the one answer trap. There is seldom one answer to a problem. If employees settle for the first answer, the best answer could never be found.

10. Keep pushing the envelope. This is defined as not playing it safe and challenging everything that happens.

11. Think about the unthinkable. Discuss and think about future problems. An example of an unthinkable problem would be, "if the company would lose customers, what new ways could revenue be generated".

12. Remain a firm contrarian. Many times the opposite view of the majority is a difficult position to take. The opposite view could be the best solution. Group think is a term used when a group of people convince each other they are doing the right thing without

questioning the solution. Peer pressure is also a form of group think.

13. Be daring. In business today there is no room for timidity. Although it can be dangerous, there are many opportunities for people who innovate.

Many of these items are personal traits of a strong leader. Strong leadership is a key to promoting creativity and innovation. The leadership of a company that exhibits these traits will be more successful in promoting creativity and innovation. Creativity and innovation will not just happen, but will need to be aggressively pursued. It is the leader's role to direct their subordinates into the areas they wish.

Research indicates that companies use many different techniques in an attempt to get employees thinking creatively. Brainstorming is a popular activity in many companies There are different techniques within the topic of brainstorming. Some companies write topics on a board and discuss the issues. Others use the internet to share brainstroming ideas. One large company has tried to accumulate ideas from their thousands of employees by starting a wish list program. A wish lists was started to get everyone involved. The wish list consisted of employees putting their ideas on paper. These ideas were problems that have been around for a while but not solved. Few of the ideas in the wish list program were pursued. The time and expense of pursuing the ideas made most of them too costly.

G. Cameron's study on innovation and economic growth suggested a relationship. Companies that had a recent innovation

grew economically at a faster rate than others. Cameron charted the money spent on research and development and the pace of economic growth. The more money spent on research and development the more patents were applied for. His conclusions were that innovation was a significant factor in economic growth.

This study researched many articles and other studies by experts in the fields of innovation, creativity motivation, and psychology. Although there was some conflicting information and theories on the subject, the consensus is that creativity and innovation are well worth the costs of resources for business.

The hypothesis of this study was that innovation was important for business to grow and to improve productivity. Cameron's study showed an increase in economic growth was directly related to innovation. Many of the other articles and studies supported this hypothesis. This research focused on two primary areas for creativity and innovation. Programs and leadership initiatives from management and understanding what creative people are looking for in their careers. Both deal with the human side of business and not with clear cut matters. One side is how leaders lead and the other is how followers follow. The concepts studied form the very basis of an organization trying to conduct business more efficiently than competitors. Albert Einstein once said that imagination is more important than knowledge. Similarly designing creative solutions and innovative products is more important than knowledge of current problems. Knowledge can easily be spread among people with time and some effort, while creativity and innovation has to develop from within a person

based on their experiences and environment. The previous studies, and this study are strong evidence that business will be well served to keep creativity and innovation in the culture or their organizations. Their competitive positions will require growth, and much growth comes from creative and innovative employees.

Limitations

Limitations within this study include finding previous studies that suggested a negative correlation between innovation and productivity. Many of the authors on the subject of innovation and creativity are consultants as interested in selling their ideas and services as they are doing research.

One of the most comprehensive studies reviewed was done in Europe. Although it was a very informative study, the factors in Europe are much different than the United States. The geographic proximity of many different economies makes it more difficult to measure the real effect of an innovation. A similar study conducted in the United States might have had more clear results.

In Shalley's research the direct effects of creativity on productivity were studied. A possible limitation in this study was the subject were all graduate students. This is a more educated group than the normal population. Also all the subjects were approximately the same age. It is very possible that age and education could be a variable in a study. Some of the articles indicated that age could be a factor in creative thinking.

Much of the literature on this subject is very current. The

limitation on that is that all of the results are not yet known. Wish list and brainstorming programs are new to many companies as a formal program. While many of these techniques have been practiced for many years through the informal organization it is only recently that companies have started formal programs with the results tracked over many years.

Suggestions for future research.

A suggestion for future research is to gather more data on the results of current programs. Also studies that use a broader base of subjects. As stated in limitations the subjects used in most of the studies were of similar characteristics. Future research could be conducted by type of industry. Some industries might produce better results in creativity programs than others. High tech industries would seem to get better results than others less dynamic industries.

Age would also be a variable in studying the effects on creativity and innovation. If age of the subject has any effect on the results, it could change how a company structures its creative solutions programs. Gender would also be a variable in a future study. It could suggest that women might attack a problem differently than men.

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