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An Examination of Four Organizational Dynamics Questions

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Submitted to the Program of Organizational Dynamics in the Graduate Division of the School of Arts and Sciences in Partial Fulfillment of the Requirements for the Degree of Master of Science in Organizational Dynamics at the University of Pennsylvania
Advisor: Larry Starr

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Abstract
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Comments
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AN EXAMINATION OF FOUR ORGANIZATIONAL DYNAMICS QUESTIONS

by

Manning J. Smith IV

Submitted to the Program of Organizational Dynamics
in the Graduate Division of the School of Arts and Sciences
in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Organizational Dynamics at the
University of Pennsylvania

Philadelphia, Pennsylvania

2012

AN EXAMINATION OF FOUR ORGANIZATIONAL DYNAMICS QUESTIONS

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ABSTRACT

This capstone is a response to four questions asked by four different professors with whom I studied in the Organizational Dynamics program at the University of Pennsylvania. The first question asked was about multi-frame analysis, and how the ability to use multiple frames is a valuable skill for managers and leaders in organizations. The second question focused on innovation, and how it can be taught in schools and classrooms to students. The next two questions focused on China; the first is about the socioeconomic and political impacts of large infrastructure projects in the United States and China, and the final question is about the economic challenges China faced in late 2011.

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CHAPTER 1

INTRODUCTION

The Four Reader Format

The four reader format is a type of capstone offered by the Organizational Dynamics program at the University of Pennsylvania. In this format the student reaches out to four former professors, and asks each to write a question. Each chapter in this paper is a response to the professor's question. Two questions related to China; the other two were about multiframe analysis and innovation. The questions are independent; there is no unifying theme.

The Chapter 2 concerns multiframe analysis, and why it is valuable. I had Dr. Alan Barstow as my professor for the class Introduction to Organizational Dynamics, where we studied the benefits of being able to frame and reframe issues in order to develop multiple solutions. Multiframe analysis is one of the skills taught in the Organizational Dynamics program.

Chapter 3 is about innovation, and how it is possible to teach innovation to students. Professor Evertt Keech taught a course on leadership and entrepreneurship, and he wanted to know if innovation could be taught to students in a classroom. If innovation could be taught, how would you teach it? The chapter examines the way the d.School at Stanford University teaches their students how to be innovative.

Chapters 4 and 5 are about China. Dr. Jean-Marc Choukroun's course "Window on 21st Century China" was a course abroad where we went to China for two weeks during the summer of 2011. We spent a week in Beijing, and a week in Shanghaii. This chapter discusses major infrastructure projects, and how they differ in the United States

and China. I have a background in infrastructure, so I was familiar with this topic and interested in the differences between the two countries.

Chapter 6 is based on Dr. Nancy Bauer's course that I completed in the spring of 2010. Her course focused on China, and how the Chinese and American economies were both intertwined. Dr. Bauer asked me to examine the economic problems that China was facing at the time of writing, which was October and November of 2011. I was interested in this topic because it dealt with some of the issues I saw in China during my course abroad, as well as what we learned in class. The chapter examines three main problems China was dealing with - a real estate bubble, bad government loans, and inflation. I also discuss how China responded to them.

CHAPTER 2

THE BENEFITS OF MULTIFRAME ANALYSIS

Question from Dr. Barstow

Dr. Barstow had me write about framing and reframing as a competence for managing and leading, creating, designing, and innovating, and adaptability, flexibility, and resilience. Specifically he wanted to explore using multiple frames, instead of just being good at one, or switching between two.

Response

Frame analysis is useful for managers and leaders because it gives them a variety of different perspectives that can be used to diagnose, and ultimately solve various problems that organizations face. Bolman and Deal (2008) have identified several frames, and have shown how using multiple frames can be effective in tackling problems and improving companies. There are several high profile examples of single frame failing, where using multiple frames would have produced much better results. Often these results based on a single frame can lead to the downfall of an organization. The ability to use multiple frames is an important skill for managers and leaders to understand and use.

The Four Frames

Bolman and Deal (2008) have identified four frames, the structural, human resource, political, and symbolic in their book *Reframing Organizations*. Each of these frames allow problems to be analyzed from different perspectives, and they can allow employees and managers to see how their organizations work in a new light. The use of

frame analysis is valuable because the problems managers and businesses encounter are increasingly complex. Bolman and Deal (2008) explain how, "explosive technological and social changes have produced a world that is far more interconnected, frantic, and complicated" then it once was (p. 6). One of the skills of framing and reframing is developing the ability to view the business and organization through multiple frames. According to Bolman and Deal (2008), "a frame is a mental model – a set of ideas and assumptions – that you carry in your head to help you understand and negotiate a particular 'territory.' A good frame makes it easier to know what you are up against, and ultimately what you can do about it" (p. 11). Incorporating frame analysis to make decisions on overly complex problems relies on an artistic viewpoint of problems in order to understand the underlying issues, and ultimately the best course of action. While using frame analysis is valuable in solving problems, other (more traditional) factors should be considered as well. Bolman and Deal (2008) explain how frame analysis is similar to art, and that, "art is not replacement for engineering, but an enhancement" (p. 21). Using frames help managers see exactly what the root of complex problems in organizations are, and it can help them chose the best course of action.

The first frame explored by Bolman and Deal is the structural frame. The structural frame is influenced by Fredrick Taylor and his studies on "scientific management," and Max Weber's work on bureaucracy and structure in organizations (Bolman & Deal, 2008, p. 48). Advocates of structure point to studies that show formal structure can enhance both employee morale and employee productivity. Moeller's study in 1968 showed a school faculty that was highly structured had a higher morale compared with a faculty with looser structure (Bolman & Deal, 2008, p. 50). The structure,

however, only helps if it is the right type of structure for the organization. The structure, "need not be machine like or inflexible," and the structure can be negative if it becomes bureaucratic, or full of red tape (Bolman & Deal, 2008, p. 51). This often happens when companies who rely primarily on structural frame thinking grow in size (Bolman & Deal, 2008, p. 62). Also, companies that rely too heavily on the structural frame can promote individual interests, instead of the company's interest. The downside of the structural frame is that it, "risks ignoring everything that falls outside the rational scope of tasks, procedures, policies, and organization charts" (Bolman & Deal, 2008, p. 339). Relying too much on the structural frame can also negatively impact innovation, and make companies more rigid and less resilient. When leaders in companies who rely heavily on a structural frame are effective they act as an analyst and architect. When they are ineffective they can be overly bureaucratic or tyrannical (Bolman & Deal, 2008, p. 356). Knowing the positives and negatives the structural frame have helps managers and leaders to be aware of potential negatives, so they can actively monitor and try to avoid them.

In some companies decisions based on the structural frame produce excellent results. One example of a successful company that primarily uses the structural frame is United Parcel Service [UPS]. The structure at UPS makes the employees more productive. UPS knows that it has a structural culture, and technology helps that culture to succeed. Because UPS knows that it functions using a structural frame, they understand that the biggest threat to is bureaucracy and micromanaging. Knowing these negatives allows managers and leaders to be aware, and take measures to prevent them.

A company that uses the structural frame, like UPS, thrives because it is NOT flexible (Bolman & Deal, 2008, p. 50).

The second frame explored by Bolman and Deal is the human resources frame. The human resources frame assumes that a company's employees ultimately want to do good work, and employees want to help their organization or company. Employees in companies that focus on the human resource frame feel like owner-operators. This frame is valuable for organizations because it aligns each individual employee's self interest with the company's overall success (Bolman & Deal, 2008, p. 128). In the human resource frame, leaders are effective if they are catalysts and servants, but they are ineffective if they are weak and a pushover (Bolman & Deal, 2008, p. 356). If managers and leaders overlook the human resource frame they can sometimes zealously cut costs, only to find that that other things (such as safety) suffer. Safety and other basic needs have to be met for the human resource frame to be effective. If these basic needs are not met employees will not feel connected to their company. One of the drawbacks of the human resources frame is that it often relies on a, "romanticized view of human nature in which everyone hungers for growth and collaboration" (Bolman & Deal, 2008, p. 339). This frame also overlooks some important aspects of power that the political frame incorporates as well. Companies that operate in a human resource frame can harness the power of having employees who are committed, and believe in the company they work for.

There are examples successful companies that have harnessed the benefits of the human resource frame. One example of a successful human resource framed company is FedEx. FedEx's culture is explained as "People-Service-Profit". Their website

emphasizes, “take care of our people; they in turn, will deliver the impeccable service demanded by our customers, who will reward us with the profitability necessary to secure our future” (FedEx Culture). FedEx’s achievements are notable; it frequently shows up on best places to work list, and most admired companies. FedEx understands what many of the human resource framed companies understand - that good, motivated employee can help businesses succeed. Instead of focusing on control from above, which the structural frame emphasizes, the human resource frame believes that employees will do the right thing, and they do not need to be micromanaged. Companies that rely on the human resource frame make decisions that place an importance on keeping employees happy. This helps keep employee moral high, which leads to happy customers.

The third frame Bolman and Deal discuss is the political frame. This frame is closely linked with power, and how power influences relationships. This frame helps one to focus on the politics of an organization, which affects who can get things done, or who has power. Companies that exist in a highly political frame require managers and leaders to look at decisions through this frame in order to understand the different expectations various parties have. One common example of this is the relationship between management and shareholders, whose priorities are not always aligned. A shareholder might want the company to cut costs in order to boost profits, while management might want to improve quality instead. Managing the variety of demands is an everyday struggle for leaders and management, and if they ignore either of these demands they will not be successful. Effective leaders and managers who operate mostly in a political frame are advocates and negotiators, but they are ineffective when they act like a con artist, thug, or they are corrupt (Bolman & Deal, 2008, p. 356). The political frame’s

drawbacks is that it can focus too heavily on conflict and mistrust instead of encouraging collaboration (Bolman & Deal, 2008, p. 339). The political frame also overlooks the human resource frame's emphasis on the employee's desire to do good work.

The final frame Bolman and Deal mention is the symbolic frame. The symbolic frame stresses that companies are often judged as much on appearances as they are on actual outcomes. Companies with a strong symbolic culture have myths, stories, rituals, and ceremonies that help align employees and reinforce a common goal (Bolman & Deal, 2008, p. 254). In a company that relies on symbolic frames, the Chief Executive Officer (CEO) is often seen as a cultural leader for the company, and they can act like a prophet or a poet if they are effective. When leaders in a symbolic company are not effective they can be viewed as fanatic and charlatan (Bolman & Deal, 2008, p. 356). The rituals in a symbolically framed company are only beneficial if all employees buy into it - they cannot be empty gestures disguised as tradition. Many aspects of the symbolic frame can be misinterpreted, and care must be taken so the rituals and stories are not perceived by employees or customers as manipulation. All of the frames mentioned above have their positives and their negatives; effective managers and leaders will use multiple frames in order to maximize the positives, and minimize the negatives of each frame.

Using Multiple Frames

Using multiple frames to analyze and solve problems allows a complex and difficult situation to be looked at in a variety of methods with clarity. Bolman and Deal (2008) state that, "multiframe thinking requires moving beyond narrow, mechanical approaches to understanding organizations" (p. 19). Because each of the four frames

mentioned above have their own benefits and drawbacks, using a variety of frames allows one to get the most out of each frame. This is important because most problems in organizations and companies are complex; they are not simply two dimensional. The complex nature of leadership and management in today's world is overloaded with data, so much so that it is often difficult to isolate the problem, let alone find a solution. It is imperative for leaders and managers to understand the problems, and then find multiple ways to address it. Managers often fail quickly; a study in 2006 showed that, "about half of the high-profile senior executives companies hire fail within two years" (Bolman & Deal, 2008, p. 8). Multiframe analysis helps leaders and managers to isolate problems, and find solutions that might otherwise have been overlooked, which will improve their effectiveness. When managers and leaders address problems using a multiframe analysis, they can be cognizant of the possible outcomes (due to each frames limitations) and determine which outcome is the least harmful for their specific situation. Sometimes a managers decision may be correct based on one frame, but incorrect if viewed through another frame. Thinking about problems using multiple frames allows one to look at problems in a focused and constructive way (Bolman & Deal, 2008, p. 21). Using multiframe thinking in conjunction with more straightforward traditional decision making will yield the best results.

The use of multiple frames instead of one frame is essential for effective leaders and managers. Bolman, with both Deal and Granell have studied managers and they, "found that the ability to use multiple frames was a consistent correlate of effectiveness" (Bolman & Deal, 2008, p. 325). They go further to show that, "multiple frame [college] presidents were viewed and more effective than presidents wedded to a single frame"

(Bolman & Deal, 2008, p. 325). Several other studies have shown that using multiple frames instead of a single frame makes managing more effective for both CEO's and principals (Bolman & Deal, 2008, p. 325). Managers and leaders who have knowledge and experience using multiple frames can use this ability to tackle a problem in a variety of methods instead of giving up after one frame fails. Frames help leaders look at situations from several different angles. As Bolman and Deal (2008) explain, "the effective leader changes [frames] when things do not make sense or are not working" (p. 339). Knowing how to use multiple frames will give one other ways to solve complex problems, and allow different perspectives to be explored.

Bolman and Deal explain how asking the simple question of "is the technical quality important?" can lead one to use multiple frames. They show how the structural frame's focus on data and logic are essential to producing quality. However, if the technical quality must be acceptable to other stakeholders (like a contractor or another outside entity) it is essential to look at decisions through the human resource, political, and structural frame as well (Bolman & Deal, 2008, p. 318). Simply looking at a decision through one frame (such as structural frame) could lead one to make a poor decision based solely on that frame, and negatively impact the organization in unforeseen ways. In the case of the technical quality, if there are stakeholders who view the quality in different ways it might be impossible to cater to both, therefore decisions should be made using other frames. Bolman and Deal (2008) also show how multiple frame analysis is useful when asking the question "are ambiguity and uncertainty high?" (p. 318). They show if the answer is no, then both the structural and human resource frames are the most valuable. However, when there is ambiguity and uncertainty it may be more beneficial

for managers and leaders to look at the situations through the political and symbolic frame instead. The more complicated situations become, the less clear the ultimate goal is. Therefore, the symbolic and political perspectives become more applicable. The structural and human resource frame work the best when there are clear goals, and the technology is clear (Bolman & Deal, 2008, p. 318) Another question that can help find out what frames to use is "are commitment and motivation essential to success?". If they are essential, the symbolic and the human resource frame apply; if they are not essential than the structural and political frames apply. In some organizations, employee commitment and motivation are needed for policies to work. For example, if upper management starts a new employee training initiative it needs the instructors to be committed and motivated in order to be successful (Bolman & Deal, 2008, p. 318). These examples highlight how one can start begin to use multiframe analysis.

Multiframe analysis is valuable for leaders and managers because it, "requires moving beyond narrow, mechanical approaches for understanding organizations" (Bolman & Deal, 2008, p.19). By knowing what different types of frames to use in various situations can help leaders and mangers make the best decisions. A variety of business cases, like the failure of CEO's such as Home Depot's Bob Nardelli or Xerox's Richard Thoman show how a leader using the wrong frame can fail, even if their policies initially produce desirable results. Multiframe thinking helps leaders remember that an organizations success is not only about financial data, it is also about the company's culture. Using multiple frames can help get the best out of an organization and its' employees.

Failures in Using a Single Frame

There are numerous cases of managers and CEO's only looking at a company's problems using a single frame, and overlooking the other frames. By only making a decision based on one frame there can be drastic negative consequences, consequences which might have been minimized if other frames were also explored. For example, McDonalds tried to loosen up its structural frame of thinking in order to move towards a human resource frame. McDonalds, using a structural frame thinking, ran like a well oiled machine. However, in the late nineties, McDonalds started looking at issues through a human resource frame, and the management decided it would be valuable to give store managers and employees more freedom and less structure. According to the human resource frame, the employees should have acted like owner-operators, and been vested in the success of the company. However, McDonalds failed to look at the benefits of the structural culture that they had worked hard to cultivate. The new human resources frame thinking at McDonalds hurt the structural frame culture they had spent years to build up. McDonalds found out that giving managers more freedom and individuality (which the human resource frame advocates) led to the quality and consistency of McDonald's products to suffer. If upper management at McDonald's had looked at the human resource frame's downsides, they could have prevented some of the quality problems they encountered. Employees in McDonald's stores became too interested in individual store profits, and allowed the quality to suffer in exchange for higher returns. Instead of being concerned about the overall companies success, personal goals instead took over. McDonald's functioned well when it was managed using a structural frame, and it had built its reputation on control and consistency. If managers and leaders of

McDonald's had looked at the possible negative outcomes the human resource frame, they could have prevented, or at least anticipated some of the difficulties they ended up encountering.

However, only focusing on the structural frame can lead managers and leaders to struggle if other frames are not also considered. One widely cited example of a former CEO who relied too heavily on the structural frame is Al Dunlap, the CEO of Scott Paper in the mid-nineties. While he was in charge he cut costs by downsizing the company, which earned him the nickname "Chainsaw Al". Initially, his cost reducing measures were a success – Scott Paper managed to double both its profit and market share. However, employees at Scott Tissue did not enjoy the company's financial success; employee morale was horrible, and Scott Tissue began losing market share. By the time "Chainsaw Al's" two year run as CEO was over, he had sold Scott Paper to Kimberly-Clark, and had personally made $100 million off the deal (Bolman & Deal, 2008, p.134). If "Chainsaw Al" had made decisions by looking at additional frames instead of only the structural frame, he could have seen the benefit of having employees who were personally vested in the well being of their company. "Chainsaw Al" failed to take into account the human resource type culture that existed (and was promptly gutted) within Scott Paper. If he had made decisions by looking at the human resource frame instead of the structural frame, he could have used the existing human resource culture to his advantage, and kept employee morale high while maintaining healthy earnings. Instead he became obsessed profits, profits which eventually caused the selloff of a very different company than the one he had taken over a few years prior. By not looking at other

frames, and locking into the structural frame “Chainsaw Al” quickly ruined the culture inside Scott Paper.

Another classic example of a CEO only using one frame for decision making is Home Depot’s short-lived CEO Bob Nardelli. When Mr. Nardelli became the CEO, he changed Home Depot’s culture from a human resource frame one to a structural frame, and made decisions using only the structural frame (Bolman & Deal, 2008, p. 135). Mr. Nardelli was convinced that cutting costs would help Home Depot financially and improve their margins without having negative long term affects. Mr. Nardelli looked at ways to improve profits through a structural frame, and decided he could boost earnings if he hired cheaper labor in their stores. Mr. Nardelli, “replaced many veteran hardware guys and retired tradesmen with twentysomethings making less money” (Welch, 2009). This strategy went against the principals of the founders of Home Depot, who had always focused on customers, and often relied on the human resource frame to make decisions. Mr. Nardelli, however, tried to convert the company’s thinking to the structural frame. The structural frame can give a CEO more power, because they can oversee more aspects of the business, and employees roles are generally clearer. However, at Home Depot this change from the human resource frame to the structural frame quickly caused loyal Home Depot customers to be frustrated with the decreased level of service offered by the cheaper employees, and, “by 2005 Home Depot’s ratings of customer satisfaction were dead last among American retailers” (Bolman & Deal, 2008, p. 135). As one author noted, Mr. Nardelli, “imposed his mechanical process on a company that was known for its great fuzzy-front-end, pro-consumer culture” (Nussbaum, 2007). In other words, he made decisions using a structural frame, instead of the human resource frame that Home

Depot's success had relied on. If Mr. Nardelli had looked at ways to improve his company's profits through the human resource frame, he could utilize the positive aspects of the human resource frame, and still maintained the "pro-consumer" culture that Home Depot's success was built upon.

Another example of a leadership and management failure due to overemphasis on one frame is NASA's Challenger disaster. This widely cited case is an example of an over-reliance on the political frame. Political factors, such as managers reluctance to delay the Challenger flight led to catastrophe, and the loss of seven astronauts. Engineers had warned their superiors that the cold weather could cause the O-rings to fail, however those in power decided to proceed with the flight anyway, ignoring the technical recommendation. NASA managers were unwilling to delay the flight any further, so the experts' recommendations to delay the flight was overruled by those in higher positions of power. In the presidential report that followed the disaster, an "institutional failure" and an "organizational breakdown" were both cited (Bolman & Deal, 2008, p. 191). The report focused on the politics; notably that management overrode engineers recommendations to delay the flight. Instead of the organizations focus being on safety and successful mission completion, managers became overly concerned with how another delay would reflect poorly on them (Bolman & Deal, 2008, p. 193) One of the questions that can help determine which frame to use is "is the technical quality of the decision important?" (Bolman & Deal, 2008, p. 317). If the answer is yes, the best frame to use is structural. In the case of the Challenger, clearly the technical quality was the most important aspect, because there is no room for error in spaceflight. However, NASA

managers and leaders unfortunately viewed the problem through the political frame instead, which resulted in the launch taking place, with disastrous results.

G. Richard Thoman, former CEO of Xerox, struggled with seeing issues through the political frame, which led to his downfall. He did not succeed as CEO of Xerox largely because, “he did not connect well enough with people to get a good feel of what was going on in the organization and what was and wasn't possible” (Bianco & Moore, 2001). His biggest mistake at Xerox was not understanding what really mattered in the company, or the political culture that existed inside. Some organizations (like Xerox) can appear to have a structural culture, however their culture might be completely different in reality. There can be organizations that appear to be structural, but are really political. This seems to have been the case at Xerox. Xerox employees at the time who were involved in meetings described a power struggle at the top. As one employee said, “Rick and Paul [the former CEO] would be in the same meeting and the line of eyes around the table would keep focusing on Paul even though Rick was doing all the talking” (Bianco & Moore). The new CEO (Rick), by failing to integrate himself in the political culture of Xerox alienated himself from the other employees, which hurt his credibility and his ability to lead. Employees at Xerox dismissed him, instead preferring to follow a veteran who understood the political nature of the company. In a company that has a highly political culture, simply having the title of CEO does not guarantee you have the power. As one Xerox employee at the time stated, “to be successful at Xerox, you have to be liked” (Bianco & Moore). Richard Thoman was an outsider, who did not understand how to be successful at Xerox because he overlooked the political frame, and assumed that his CEO title alone would give him power.

In each of these cases, one frame was used instead of multiple frames. In the end, only using one frame caused the company's policies to fail. Each frame has its positives and negatives. For example the structural frame relies too heavily on rationality, and it overlooks the impacts of power and other less tangible aspects. Richard Thoman, using the structural frame, overlooked these aspects, which led to his failure. One of the downsides of the human resource frame is that it gives people too much credit by always assuming they want to do their best. McDonalds found this out the hard way, when employees let their stores get dirty, and the quality suffered. Bob Nardelli looked at the problems he faced at Home Depot through a structural frame, and decided that it would be cheaper to get younger employees. He failed to see that the company was successful because it used a human resource frame, and that customers liked their experience in Home Depot stores. "Chainsaw Al" sacrificed long term success for short term profits, and managed to gut the culture Scott Paper had enjoyed in a few short years. In each of these examples, a leader or manager failed because they failed to look at problems through multiple frames. If the people mentioned above had been trained to use multiframe analysis, they would have been able to address each problem in several ways, and would have known the possible benefits and drawbacks of each. Using multiframe analysis allows problems to be isolated and addressed in multiple ways.

Another reason it is valuable to look at these issues through multiple frames is because all of the frames influence each other. For example, at Bavarian Motor Works (BMW), all employees are encouraged to speak out - their opinions are valued regardless of their title. BMW managers know that there is a great deal they can learn from the workers on the floor (Bolman & Deal, 2008, p. 51). This belief in all employees

contributing to the company's success helps the company move towards a more human resource frame, where employees feel a connection to where they work, and feel personally rewarded for the company's success. This free exchange of ideas between managers and workers influence the power frame. BMW, by allowing employees to talk to managers, and even make suggestions to managers helps eliminate some of the problems that arise when looking at the political frame. Having a strong human resource based culture helps dissuade office politics, and foster relationships between people's different specialties. This can help minimize the disconnect between engineering, management, and operator culture as well.

It is necessary to use multiple frames because all frames influence each other. For this reason it is imperative to look at issues through multiple frames. Looking at problems through each frame allows the issue to be isolated, and it provides multiple solutions. While all frames might not be needed for each situation, having the ability to use multiple frames will yield much better results than relying on only one frame. Knowing how to use multiple frames is important, and managers and leaders should learn and understand how to use this skill.

CHAPTER 3

TEACHING INNOVATION, THE d.SCHOOL WAY

Question from Professor Keech

Professor Keech was interested in innovation, and whether it is possible to teach it. Can you turn people into innovators? How do you teach innovation? How do you incorporate teaching innovation into universities? How can you create an innovative learning environment?

Response

Innovation is an important skill, one that should be taught in universities, companies, and organizations worldwide. Innovation, especially technological innovation, has accounted for more than half of America's economic growth since World War II (Deshpande Center for Technological Innovation, 2011). However, many companies in today's world focus too heavily on quarterly earnings instead of long-term research and innovation. Innovation is currently being taught in some colleges like Stanford University's d.school. In many ways, universities are ideal places for innovative thinking, because they naturally, "create a public space for the exchange of ideas" (Steen, 2011). Universities create the ability for experts to collaborate easily, and this free flowing exchange of ideas boosts creativity (Steen, 2011). Innovation can be taught in schools, however in order to do so requires a different way of teaching. Elementary education is primarily based on "repetition and memorization" and a single right answer. This rigidity found in most schools has been shown to be detrimental to innovation (Phillips, 2011). Other childhood experiences, such as standardized test-

taking can introduce a fear of failure that hinders risk taking, which is necessary in innovation. Instead of fearing failure, failures should be seen by innovators as learning tools which help identify problems and solutions. Universities and organizations that want to promote innovation need to "unlearn" much of what was learned in childhood, in order to focus on being creative. The problem is "somewhere around fourth grade most of us stop thinking of ourselves as creative so our ability to innovate atrophies" (Geer, 2011). However, there are programs in universities and other schools across the country that are trying to reignite creativity and innovation in their students.

One of the most successful programs in the country at teaching creativity and innovation is the Stanford University's d.school, formally known as the Hasso Plattner Institute of Design. Although the school is only six years old, it, "already has a mystique as a teaching center others want to imitate" (Antonucci, 2011). The d.school is very popular, and has grown from 30 students to more than 700 in just six years. The d.school remains in demand even though it does not offer a degree. Students at the d.school come from all seven of Stanford's graduate schools; however the d.school works primarily with the Engineering and Art Schools (Geer, 2011).

At the heart of d.school is teaching people to be innovative by emphasizing the process instead of the products. The goal is teach the graduates to have "innovation confidence" where they are open to new ideas, and not afraid of failure. Teaching creativity, however, is very difficult. Teaching creativity, "involves multiple routes, multiple approaches, and, obviously it's virtually impossible to teach whether or not you've succeeded. The measure of success is likely to come along after" (Antonucci, 2011). However, the professors in the d.school argue that it is possible to teach

innovation. The d.school strives to "unlock [students] creative potential by teaching them to become, among other things, more open to experimentation, more comfortable with ambiguity, and less afraid of failure" (Geer, 2011). The d.school draws on students and teachers from difference disciplines, because they believe that people learn best by collaborating with people who have different perspectives. In one example a musicologist, neuroscientist, journalist, and two lawyers collaborated on a class exercise together. This type of unique collaboration is encouraged at the d.school.

The d.school relies on "d.mindsets" which set guidelines, "d.methods" which provide ways to think about a situation or issue, and "d.modes" which are the steps. The d.school provides a variety of materials free for use (under the creative commons license). The d.school hopes that educators will use their methods to teach innovation and creativity to students across the world. The d.school provides a *Bootleg Bootcamp* (see Appendix A for links to the d.school materials mentioned) which is designed to show teachers how to introduce students to the d.school's design thinking methods. The *Bootleg Bootcamp* also explains the d.mindsets, d.methods, and the d.modes the d.school teaches. The d.school also provides (free for use) two 90 minute fast-paced projects called the *Wallet Exercise*, and the *Gift-Giving Exercise* that let students experience a full design cycle, and lets them explore the d.mindsets, d.methods, and d.modes that are the foundation to the d.school. This paper will discuss the mindsets, methods, and modes of the d.school, and it will explain the Wallet Exercise, and how it can be used to teach students to think more innovatively.

d.Mindsets

The d.school has a specific way to teach innovative thinking, and d.school's founder David Kelley believes this method can be taught to teachers and students. There are a variety of techniques to help people think innovatively, called the d.mindsets. These d.mindsets are:

- Show don't tell
- Focus on human values
- Craft clarity
- Embrace experimentation
- Be mindful of the process
- Bias toward action
- Radical collaboration

The first of the d.mindsets is show don't tell, which emphasizes communicating your vision by using stories and visuals in order to create an experience. The second is focus on human values, this stresses that having empathy and understanding of the people you are designing for is essential in designing a good product. The third mindset is craft clarity which stresses the importance of having a clear and focused vision, even if the problems themselves are messy or vague. The fourth is embrace experimentation. This goes hand in hand with the d.school's belief that developing prototypes and models are a vital part of the design process. Prototyping should provide different ways analyze the problem, instead of being a way to confirm your idea. The fifth is be mindful of the process. This mindset helps students stay focused on where they are in the design process, and helps them know what methods to use. The sixth of the d.mindsets is bias

toward action. This promotes the d.school's belief that it is more important to act than to discuss. The final mindset is radical collaboration. This mindset encourages unconventional groupings, which lets different people with different viewpoints to work together on common solutions.

d.Modes

All of these d.mindsets should be taken into account when students use the d.modes. The d.modes provide a structural framework for innovation, and innovative thinking. Primarily, these d.modes help students to think more creatively, and move through the design process. The five d.modes are:

- Empathize
- Define
- Ideate
- Prototype
- Test

The empathize mode is considered, "the foundation of the human centered design process" (Bootleg Bootcamp, n.d.). The empathize mode requires the students to observe, engage, and immerse the users. The idea behind the empathize mode is to understand the people for whom you are designing for. Watching people in their own environment allows the students to get clues about what they think, and how they feel about certain aspects of the item or situation. The empathize mode also allows designers to get unique insights about the user they might otherwise have overlooked.

The second type of d.modes is define. This mode builds on the empathize mode, and allows the innovator to focus on a specific challenge. The goal of the define mode is to have a clear problem to solve, so there can be clarity and focus when developing the solutions. One example of the define mode's importance was the d.school's development of an incubator for developing countries, which suffer from high infant mortality. For the empathize and define modes, students went to Nepal and spent time with both mothers and doctors. They found that most births take place in rural areas, where access to hospitals is very limited. As a result of the define mode, the students realized that building a cheap incubator would be useless. The problem, "was about keeping babies warm, not cheaper incubators" (Geer, 2011). Using the empathize and define modes helped the students to have a clear objective, and allowed them to get closer and more familiar with the problem. It is likely that the students would have begun building cheap incubators, had they not had firsthand experience with the doctors and mothers of Nepal.

The third type of mode is called ideate. The ideate mode is focused on creating new ideas. While the define mode was about focusing, ideate mode is about expanding. When in the ideate mode, students should be thinking of abstract solutions, no matter how wild or impossible they seem. The ideate mode encourages idea generation, and allows a variety of ideas that are then able to be prototyped. One of the keys to the ideate mode is developing a large volume and a wide variety of potential ideas.

Once the users' problems are understood, the problems have been defined, and various ideas have been discussed, it is time for the fourth mode, prototype. Prototyping is simply putting the concepts and ideas thought of in the ideate mode into the physical world, where they can be tested. Sometimes they are as crude as a drawing on the back

of a napkin, or a wall of post-it notes. The d.school emphasizes that these prototypes do not need to be elaborate or polished, prototypes can literally be made out of any material. The goal of the prototype should be to allow the user and others to interact with it. Prototyping has several advantages, it allows the designer to: gain more empathy for the user, develop multiple solutions, test and refine solutions, and inspire others with the designer's vision

The fifth mode students at the d.school learn is the test mode. The test mode is where prototypes are used, and designs are refined based on the results. One of the phrases d.school uses is, "prototype as if you know you're right, but test as if you know you're wrong." (Bootleg Bootcamp, n.d.) This emphasizes that innovators should not be afraid to be critical of their designs, instead they should look for problems (and develop solutions) with their prototype. The test mode also allows innovators to interact more with their users, which can help build more empathy. This can lead to a new and deeper understanding of the problem, which can yield new innovative solutions.

d.Methods

There are many d.methods that are designed to help aid the students in design thinking. These d.methods can be used in the d.modes. The d.school's Bootleg Bootcamp lists 48 different d.methods, but the most important d.methods for students new to design thinking are:

- What? How? Why
- Interview Preparation
- Interview for Empathy

- Extreme Users
- Saturate and Group
- Empathy Map
- Why-How-Laddering
- Point-of-View Madlib
- Stoke
- Brainstorming
- Facilitate a Brainstorm
- Selection
- Prototype for Empathy
- Prototype to Test
- Storytelling
- I Like, I Wish, What If

The first d.method, What? How? Why? is designed to get students to start speculating about the user, and ask “deep” questions. The set-up for this method is dividing a piece of paper in three sections: What?, How?, and Why?, as shown in Figure 1. Then the student should transition from concrete questions and answers to more abstract, speculative questions and answers. One way to do this is to have photographs of the user’s interaction with the situation or item. This process helps the students to gain empathy with the user, and it helps them better understand the scenario.

Figure 1. What? How? Why?

The next two d.methods are about interviewing. Interviewing is a useful technique to gain an understanding of the people affected by the issue or situation. The interview preparation method prepares the interviewer with well thought out questions, grouped together by themes. When the themes are known, the interviewer should organize the themes to help make the conversation feel less formal and more natural. Being organized also helps maximize the subjects time. The interviewer should make sure they have plenty of "why" type questions, and ask users how they feel about the situation or idea. This helps the student gain empathy for the user, which is the next d.method. By interviewing for empathy, users can get a better understanding of the situation. In order to innovate for someone, it is valuable to explore their emotions, motivations, and thoughts. Knowing the users well makes it easier for the students to design for them, and satisfy their needs and desires.

The next d.method is becoming familiar with the extreme users. The extreme users provide the student innovators with valuable information. Extreme users' needs are heightened, so they often customize products to suit their needs. These users will help

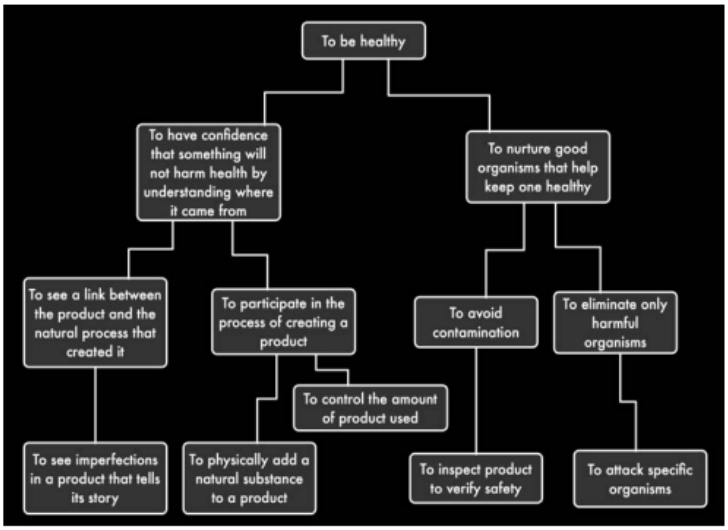
students see the possibilities of the design, and what innovations would be the most useful. In addition, getting to know the extreme users can help aid the students to think outside the box by exposing them to the product in new environments or configurations.

Once the various users have been interviewed and the data has been collected, it is time to use the saturate and group method. This method helps put the information down visually in order to see patterns or themes. This is done using wall space. The idea is to have a lot of space to organize findings into groups. This helps focus on different issues, and also helps to highlight the similarities and differences between various types of users as well.

The d.method of an empathy map helps the students to develop a deeper, more personal understanding of the user. At d.school, an empathy map is a four quadrant blackboard or piece of paper, with four quadrants asking “What did the users: Say, Do, Think, and Feel”. These questions help the students to think about the user in terms of feelings and emotions. The empathy map also helps the students identify the user’s needs, and can offer them insights to aid in the design process.

The why-how laddering is the next d.method. The why-how line of questioning helps to limit some of the more abstract ideas that would not be actionable. Figure 2 shows the why-how laddering with regards to being healthy. The why part of the why-how question focuses on the abstract, whereas the how part focuses on the specifics. Using both questions together can result in answers that are both practical and realistic.

Figure 2. Why-How Laddering



Point-of-View Madlib is a technique that allows the students to reframe the challenge into an actionable statement that should lead to idea generation. This helps the students to develop their own point of view, which helps them develop unique solutions. At the heart of the Point-of-View Madlib is defining the user, the need, and the insight. Putting these definitions together can present new ways to look at the problem, and develop innovative solutions.

The next d.method is stoke, which are activities designed to help both individuals and teams loosen up. The goal of the stoke method is to increase creativity and energy. The stoke method relies on fun activities that require the students to listen, think, and do. Some examples of good stoke activities are Pictionary, or various improvisational comedy games. Generally the stoke method only lasts five to ten minutes, and helps refresh and re-energize the students.

The next two methods are about brainstorming, and ways to facilitate a brainstorm. Brainstorming helps generate ideas by using all the students (or teams) together to come up with ideas. The idea of brainstorming is to develop ideas, even if they are abstract. The focus of brainstorming should be idea generation, not practicality. The students should not judge the others on their ideas, and the students should feel free to contribute in a safe environment. The facilitate a brainstorm method relies on a student to help add energy to the brainstorm discussion, spur on different ideas using constraints, and create a unique space for brainstorming. Keeping the energy up in a brainstorm helps ideas to flow, and maintains the student's focus. Adding limits such as "what if this had to weigh a pound?" and "what if it had to weigh one ton?" can help generate new innovative ideas. Even if the ideas are not practical, it is still valuable to discuss, and it helps students feel safe to contribute. The brainstorming space should be set up large enough to develop many solutions, but small enough that everybody still feels included. Brainstorming should be a safe place where students can contribute ideas free of judgment from their peers.

After the ideas from the "Brainstorm" methods have been written down, it is important to sift through the ideas and select the best. It is important for the students to keep a wide range of ideas, and avoid narrowing the ideas too quickly. The ideas can be selected by team members voting, or by keeping several different, unrelated ones. It is more helpful to have several, and to not be overly committed to any specific idea yet. Winning ideas should be reflected upon, and there should be a discussion over why it was preferable. This can help isolate the desires, which can be used to develop new solutions.

The next two methods deal with prototyping. Once a clear set of ideas are generated using the previous brainstorming methods, prototypes should be developed. The prototype can be as simple as a drawing, or as complex as a 3-d rendering, however they should be cheap, and quickly made. The idea in d.school is to test things both cheaply and frequently, as many tests are preferable to one test. The first prototype method is prototype for empathy. This method helps students to design for the users, and helps see what the users would like in your design. Prototyping for empathy helps the student to see the users' design space, and know how they feel about the design. The other method for prototyping is prototype to test. Building prototypes quickly, with the intention of testing them quickly allows many tests to be completed. Each of these tests could be about a specific aspect of the design, and can help students gain a better understanding of the users' desires. When the prototypes are tested, they should be done so in an environment where the users can react and interact with the designers. It is also important to test the designs in context instead of testing them in a more rigid, sterile environment. Again, the idea is to get real feedback in a real setting, and by doing this gain a deeper understanding of the user and the issue.

After the prototype has been designed and tested the students should think about the process in a story. The d.method for this is storytelling which highlights the benefit of stories as a way to pass along information. The other d.methods can help the story, incorporating aspects like the empathy, insights, and solutions. The storytelling method can explain to others the issue you resolved, or the design you have invented. And, since much of the process was focused on users, it can set up human connections and solutions.

The final method is I Like, I Wish, What if. This method uses communication and feedback to learn about the team, and provide constructive feedback. Reviewing with others what aspects of the process worked, and what did not work allows the next process (or revision) to be improved.

Design Challenges

Because so much of the emphasis in d.school is on the process, rather than the result, the d.school kindly provides two "design-challenges" to get innovators familiar with the d.mindsets, d.methods, and d.modes mentioned. These design challenges only take 90 minutes and are used to immediately, "immerse students in a constant churning of rethinking, repurposing and recommitting, even when they've been battered by a series of failures." (Antonucci, 2011) This sink or swim philosophy that the d.school has developed allows (and encourages) students to fail often and early with their prototypes. It also emphasizes the d.mindsets of bias towards action, which contends that people learn better by "doing", not by "thinking". As one of the co-founders of the d.school explained, "if you go through lots of little tests, you learn more than if you just do one test" (Geer, 2011) The design challenges are used to show how the d.school teaches.

There are two design challenges, "the wallet project" and "the gift-giving project". Both of these challenges are similar, with some key differences. The wallet project allows every student to have an item (their wallet/purse), and it yields a physical, more easily prototyped solution. The gift-giving project encourages the students to get personal quickly. The gift giving project is preferable with more analytic students, because it puts their strength (functionality) aside. Solutions from the gift-giving project

are usually technology or service-based, which is more difficult to prototype. For this exercise, I will use the wallet project to demonstrate the various d.mindsets, d.methods, and d.modes mentioned previously.

The Wallet Project

In the wallet project, students do a "full cycle through the design process". The whole project is broken down into steps, and worksheets are provided to guide the students (a link to the worksheet is provided in Appendix A). There should also be some facilitators (or a professor), who can help and guide the students (a link to a facilitator's guide is provided in Appendix A). The wallet project starts with the facilitators asking the teams to design the ideal wallet. This is the first step, and it is good if the students feel rushed. This step shows the students how unfocused designing is not as valuable as taking the d.school's "human-centered design approach". The second step is to have the students to interview each other in order to gain empathy. The students should ask their partner to go through their own wallet and discuss it using stories. The interviewer should ask "why" type questions. They should then dig deeper and try to find out what is important to their partner by following up on questions that sparked interest. After the students interview, they should (individually) reflect on what they learned during their interview, and take a specific point of view. The student's point of view should say what their design is going to accomplish, and it should be practical. The next step is "ideate", which is designed to generate ideas. The focus should be on the quantity, not the quality of ideas, and the students should use some of the d.methods to generate many different ideas. After ideas have been generated, the students should discuss them with partners,

and get feedback on their design. Then, the students should reflect on their own design, and make revisions to the design based on the feedback.

The students should then turn their ideas into a prototype that can be tested. A physical (but low-resolution) prototype should be developed. If the idea is something less tangible, like a service or a system, a scenario should be created that allows others to experience the innovation. After the prototype has been built, the prototype should be tested, and the students should get feedback. Students should not be attached to their prototype, they should be able to let go both emotionally and physically. Instead of defending their prototype, the students should watch and see how it was interacted with. The final step in the design challenge is to reflect. Reflecting helps the group to learn from each other, and share their experiences. Asking what people liked about their partner's prototype or idea is helpful in getting constructive feedback. The people who created the prototype can also be engaged. The students should learn the core d.mindsets, d.methods, and d.modes that are the foundations of the d.school. Having empathy for the user creates a human-centered design, experimentation and prototyping helps test ideas and get feedback quickly, and a bias toward action encourages prototypes to be built quickly and frequently. The mindsets and modes create stories which can effectively communicate the methods of the d.school.

These are ideas that the d.school employs in order to teach people how to be innovative, and although the school is only six years old, their accomplishments are already impressive. The d.school still gets three times as many applicants as there are available spots, and employers are, "starting to seek out students with d.school credentials" (Geer, 2011). The d.school has produced a company which makes solar

powered lanterns for developing countries, a company that makes incubators for third world countries, and Pulse, a company that makes iPhone apps. Educators from around the world come to d.school to learn the ways they teach innovation, in the hopes that they can start similar programs in their schools. Perhaps the most impressive company to come out of d.school so far has been Pulse, which went from an idea to a revenue-generating product in just six weeks (Greenberg, 2010). The founders of the company used the skills learned at the d.school to rapidly build and test their idea. The d.school's methods, mindsets, and modes helped them to innovate and, "upend what seemed like an established market for digital newsreaders and compete with major incumbent players like the *New York Times*" (Greenberg, 2010). Pulse's app became the top app purchased for the iPhone, and Steve Jobs mentioned it at Apple's Worldwide Developers Conference (Roethel, 2010). The concepts taught in d.school that helped make Pulse a success can be adopted by all educators, and can help teach students the skills needed to become innovators. What the d.school teaches is "behavioral change that enables students to gain innovation confidence" (Geer, 2011).

CHAPTER 4

THE SOCIOECONOMIC AND POLITICAL IMPACTS OF LARGE INFRASTRUCTURE PROJECTS IN AMERICA AND CHINA

Question from Dr. Choukroun

Professor Choukroun asked me to compare major infrastructure projects in America and China. He wanted to know about the socioeconomic and political impacts of large infrastructure projects in each country. What were the reactions of each approach, and what was the end result?

Response

Infrastructure is built very differently in China and America. China is able to build infrastructure projects incredibly fast, while major infrastructure projects in America often take years before construction begins. Infrastructure projects in both countries have a variety of socioeconomic impacts. For example, infrastructure projects in China tend to be less environmentally friendly, and are often criticized for being more unsafe than their American counterparts. Politically, infrastructure projects are viewed much differently in both countries as well. By looking at several large infrastructure projects in China, and a large infrastructure project in America, the socioeconomic and political issues are examined, and the advantages and disadvantages of building major infrastructure projects in each country is explored.

Three Gorges Dam Socioeconomic Impact

Table 1. Three Gorges Dam (at-a-glance)

610 foot dam wall extends 1.3 miles
Reservoir will extend over 350 miles
Dam will produce energy equivalent to 15 nuclear plants
Construction cost of $30 billion USD
1.4 million people in reservoir area relocated
Took 14 years to complete (1994 - 2008)

China's ambitious Three Gorges Dam project (see Table 1) has had a huge socioeconomic impact on millions of Chinese. The Three Gorges Dam project involves the construction of a 610 foot high wall for 1.3 miles ("Great Wall Across," n.d.). The dam will create a massive reservoir that will extend over 350 miles ("Great Wall Across," n.d.). The new reservoir will flood 13 cities, 140 towns, 1,300 villages, and it will bury ancient temples and other historic landmarks ("Great Wall Across," n.d.). The projects hydroelectric plants will produce the energy equivalent of 15 nuclear plants and is expected to cost over $30 Billion USD ("Great Wall Across," n.d.). The project, however, has been plagued with complications, which has had a several socioeconomic and political impacts throughout China.

A significant portion of China's investment in Three Gorges Dam has been spent relocating roughly 1.4 million people from the reservoir area. Before the relocation, the area was already very poor, with the affected area's GDP of only 40% of the national average (Yinan, 2011). Some of the areas around the reservoir have a per capita net income of only $1.26 a day (Yinan, 2011). The people who were forced to relocate had to make a difficult choice. One option was to move to higher ground, however they would get a smaller land plot and the land would be unstable and poor for farming (Yinan,

2011). Because of the poor land, 40% of all farmers will no longer farm, and they will be "forced into occupations for which they have neither the skills nor the qualifications" (Hwang, Xi, Cao, Feng, & Qiao, 2007). Approximately 80% of the residents who were relocated choose this option. The area is now plagued with water pollution because the dam makes the water move much slower, which prevents it from pushing as many pollutants downstream as it used to (Yardley, 2007). The banks around the reservoir are also susceptible to landslides, and some experts are concerned that the massive downward pressure from the reservoir could cause earthquakes (Yardley, 2007). The relocated residents' farmland is so poor that some have been offered land and financing to move once again (Yardley, 2007). Another four million residents in the region will need to be relocated, with two million of them in the reservoir area (Yardley, 2007). National Institute of Health Studies on the Three Gorges Dam project shows that when people are forced to relocate it causes mental stress and depression (Hwang et al., 2007). In addition, relocating weakens social support, especially when it happens twice in a relatively small amount of time (Hwang et al., 2007). These issues could affect a large amount of people in the area around the Three Gorges Dam project.

The second option residents forced to relocated by the Three Gorges Dam project is to move to a nearby city. Approximately 20% of residents forced to relocate went to nearby cities, which has caused overcrowding and a lack of available jobs (Yinan, 2007). The population density in these cities is now very high, at twice the national average (Yinan, 2007). In addition, there is a lack of land for industrial use which also hurts job growth. Many of the people who migrated to the cities are now returning, because of the lack of jobs and the overcrowding. The citizens who return no longer have local

residency permits, and are now illegal residents. These socioeconomic issues could have a lasting effect on millions of Chinese families, which could impact China politically.

Three Gorges Dam Political Impact

The massive Three Gorges Dam project has had a significant impact in China politically, as well as socioeconomically. The Three Gorges Dam project was always controversial, with over 30% of congress voting against it in 1992 ("Three Gorges Dam", n.d). Supporters of Three Gorges Dam hoped that it would become a symbol of China's vitality (Kennedy, 2011). The government has even opened a Three Gorges Dam tourist area to show off the project. In some ways it can be positive for local political leaders to show problems with Three Gorges Dam because pointing out problems can secure more financing for their local communities. Whatever the reason, support in China for the dam project is eroding, with critics saying that "government officials exaggerated the benefits and underestimated the risks" (Ford, 2011). Skeptics say the only thing that mattered to government officials was the prestige of building the dam, not the safety and well-being of residents and their environment.

However, recently China's Premier Wen Jiaboo admitted that "there are problems that must be urgently resolved in the smooth relocation of residents, ecological protection and preventing geological disasters" (Beach, 2011). What was once supposed to be a symbol of China's vitality has now become a boondoggle, causing embarrassment for China's central government. Because of the effect of Three Gorges Dam, the Chinese government also has to deal with protests resisting the building of new dams. One dam project, the Pubuguo hydroelectric plant, had 100,000 protestors in 2004. Most of the

protestors were farmers, and over 10,000 police were needed to stop the riot ("Up To 10,000 Protesting Farmers Clash With Police", n.d.). This type of social unrest will eventually affect the central government, and could weaken the communist party's influence. The political and social impacts of China's major infrastructure projects will continue to affect China's course over the next few decades, and the latest major infrastructure project in China has been their high speed rail program, which also has a variety of socioeconomic and political impacts.

China's High Speed Rail Program Socioeconomic Impact

Table 2. China's High Speed Rail (at-a-glance)

Planned cost of over 293 Billion USD
9,676 km of high speed rail in operation*
16,000 km of high speed rail planned
Top speed of 380 km/h
Employs 6.3 million people
Construction began in 1999 and is ongoing

*as of June, 2011

China's other major infrastructure project is High Speed Rail (see Table 2). At a planned cost of over 1.87 trillion Yuan ($293 Billion USD), it is a source of great national pride for the Chinese, and the central government ("China's High Speed Rail Revolution", 2011). As of June, 2011 there were 9,676 km of high speed rail in operation ("China's High Speed Rail Revolution", 2011). The total plan for high speed rail in China calls for 16,000 km of dedicated high speed rail, connecting all cities by 2020, and allowing for speeds up to 380 km/h (237 mph) ("China's High Speed Rail Revolution", 2011). The current high speed rail system in China is impressive. If an equivalent high speed rail system was built in the United States it would allow a Boston resident to catch

a train in the morning, have lunch in Philadelphia, have dinner in Williamsburg, Virginia, and return to Boston before midnight (Bradsher, 2010). The railway ministry is huge in China, with an outstanding debt of 2.09 trillion Yuan ($328 Billion USD), or five percent of China's GDP ("China's High Speed Rail Projects on Hold", 2011).

High speed rail will have a great socioeconomic impact in China. High speed rail reduces carbon emissions, which will help improve air quality across the country. It will reduce the cost of highway maintenance and relieve congestion in China's traffic-jammed expressways. Improving traffic congestion will help make the cost of China's goods cheaper, and easier and cheaper to export. In addition, high speed rail technology could be great for China's economy, as they could patent and sell the technology abroad (as they are currently trying in America and Europe). High speed rail also stimulates the economy, creating jobs and keeping Chinese citizens employed during a global recession. High speed rail also spreads economic development over a larger area, and it gives China's central government control over where economic development takes place. It also gives them the ability to "change population locations and employment patterns over time, caused by improved accessibility and reduced travel times" (Dip, Brunello, & Bunker, 2011). High speed rail also allows China to free up existing railway traffic for freight, rather than passenger rail. Since most electricity in China is produced by coal, freeing up fright traffic allows electricity plants to get coal quicker and cheaper, and this could alleviate some of the brownouts that have plagued China for years (Bradshear, 2010).

Recently, work on 10,000 km of high speed rail has been suspended in China, and railroad workers have been laid off. According to estimates, three million migrant

workers and employees of rail companies have been either laid off, or not paid for the work they have already completed ("China's High Speed Rail Projects on Hold", 2011). Rail projects across China employ around 6.3 million people, and involve 18 million families ("China's High Speed Rail Projects on Hold", 2011). As one engineer said, "If these workers cannot get their payment soon, it might trigger nationwide social unrest" ("China's High Speed Rail Projects on Hold", 2011). The fare for high speed rail is pricey - too expensive for most migrant workers, which has also caused some discontent. The train cars are frequently half full, because the migrant workers who travel do not want to pay five times the price of a regular ticket, their time not worth the extra money ("China's High Speed Rail Projects on Hold", 2011).

China's High Speed Rail Program Political Impact

In addition to the socioeconomic issues with high speed rail in China, there are a variety of political issues associated it as well. Politically, it helps show local governments and their citizens that the central government is committed to reducing carbon emissions, which the government stressed in their most recent five year plan. Also, high speed rail construction allows the central government to put their citizens to work, which has helped China maintain its impressive annual growth through a worldwide economic downturn. However, several issues have recently come up that has swayed public opinion on the project, which could make the project politically unfavorable. One issue is corruption in the railway ministry. The chief of the ministry allegedly took $122 million in kickbacks on contracts relating to China's high speed rail program ("China Slows Down High-Speed Trains", 2011). Additionally, the former

deputy chief engineer for Chinese railways was found to have a staggering $2.8 Billion in overseas accounts, according to a CCTV report (Moore, 2011). Both of these leaders were considered to be the "founders" of high speed rail in China, and their arrest was seen as a blow to the party and high speed rail's credibility.

In addition to the corruption allegations, there are also fears corners were cut in the building of high speed rail after a deadly July accident in Wenzhou. In the accident, one train collided with the rear of a stalled train on the same track. It killed 40 people and injured over 100 (Johnson, 2011). After the accident, China's central government was accused by many citizens of covering up the accident instead of addressing the problems clearly and transparently. Shortly after the accident the central government had workers bury the train cars, because they claimed the trains held confidential technology (Johnson, 2011). The public was outraged, claiming that the wreckage "needed to be carefully examined for causes of malfunction" (Johnson, 2011). The government's explanation of the cause of the accident was also vague and cryptic, which further agitated the public. When questions about the explanation of the crash came up, the government censored media reports, and told media outlets to not question the official story (Johnson, 2011).

After the accident, many Chinese began to question their country's ambitious plans for high speed rail. Some pointed out that it had taken other countries 100-200 years to develop their railway systems, and China was trying to do the same in 10-20 years ("After China Train Crash", 2011). Critics questioned why the signal system in China was only tested for 25 days, when similar systems in other countries would be tested for at least three months ("Wenzhou Train Disaster", 2011). Chinese citizens were

also concerned that the rail line was reopened a mere 30 hours after the accident, when the exact cause of the crash had not yet been determined ("China's Awkward Quest", 2011). An internal report about the accident listed over 170 "manufacturing quality problems" with the high speed trains involved in the collisions ("China's Awkward Quest", 2011). All of this has made the public nervous about the central governments rapid pace of infrastructure projects in the country.

The Wenzhou train collision has caused the central government recently to shift its focus from passenger rail to freight rail. By stopping work on 10,000 km of highway that was once going to showcase their technology to other countries, China has sent a clear indication that they are reconsidering the political impacts of the program. High speed rail was once a matter of pride for China's central government, which opened the Shanghai to Beijing line in conjunction with the 90th anniversary of the communist party ("China's Awkward Quest", 2011). However, with continuing problems on high speed rail, what the central government thought could be one of their great accomplishments is now turning into a problem for them, both politically and economically.

California's High Speed Rail Socioeconomic Impact

Table 3. California's High Speed Rail Project (at-a-glance)

800 miles of track *
Cost of $98 billion*
10 years to complete*
Top speed of 220 mph
Expected to create 150,000 construction jobs
Additional $360 million per year spent in downtown Los Angeles
Additional 1.64 million new visitors per year to downtown Los Angeles
$7.6 billion a year in new business expected for Los Angeles

*Planned

The largest infrastructure project in America is the high speed rail project in California (see Table 3). This project involves installing 800 miles of track, and is currently estimated to cost $98 Billion over the next 10 years (Williams, 2011). California's high speed rail system would allow a top speed of 220 mph, which would allow travelers to go to LA to San Francisco in under two hours and forty minutes ("California High-Speed Rail Authority", 2011). By contrast, a similar distance on Amtrak's Acela trains (currently the fastest trains in America) would take over five hours.

California's high speed rail project will have a variety of socioeconomic effects. It is expected to create 150,000 jobs in the construction industry, which will help those affected the most by the economic downturn. The project is also expected to create an additional 450,000 new jobs. These jobs will lead to increased revenue for local municipalities, the state, and the country as a whole ("The Economic Impacts of High-Speed Rail," 2011). High speed rail is expected to develop more economic opportunities for businesses, and large office complexes can be built in the new train stations. There have been successful office building projects in both Chicago's Union Station, and

Philadelphia's 30th Street Station ("The Economic Impacts of High-Speed Rail," 2011). High speed rail also improves the travel times between cities, and these gains can lead to increased business productivity. It also provides an additional revenue stream from visitors to the area, which can create economic opportunities for struggling local economies. Downtown Los Angeles is expecting at least $360 million per year in new spending which will provide 4,000 new hotel, restaurant, and retail jobs in the area ("The Economic Impacts of High-Speed Rail," 2011). An additional 1.64 million residents per year are expected to visit downtown Los Angeles. The new visitors are expected to be residents who would typically avoid downtown, due to congestion and a "perceived lack of parking" ("The Economic Impacts of High-Speed Rail," 2011).

High speed rail can also create larger labor markets, because businesses have more people to chose from and can be more selective and employ people with superior skills they otherwise would not have had access to ("The Economic Impacts of High-Speed Rail," 2011). The increased popularity of telecommuting to work means employees do not have to be at the office every day, and they are more willing to travel further the two or three days a week they are required to be in the office ("The Economic Impacts of High-Speed Rail," 2011). High speed rail also encourages research and development centers (like universities), because colleagues can travel to work together on complex issues easier. Los Angeles alone expects as much as $7.6 billion a year in new business sales, which could produce 55,000 new jobs, and $3 billion in new wages ("The Economic Impacts of High-Speed Rail," 2011).

There are some negative socioeconomic issues with California's high speed program as well. Critics argue that the money currently being spent on high speed rail

could be better spent on other programs in California. High speed rail has had a negative effect on residents who live along the proposed route. The project is likely to require the relocation of many people and businesses, however California residents currently do not know the plan, so they do not know if they are going to be relocated or not. This makes selling any sort of land or home along the route difficult, because they do not know whether they will be affected (Cowan, 2011). The high speed tracks could cut through the heart of some towns, like Bakersfield, California. Relocation of the residents and businesses through the eminent domain process would probably be tied up for years in court. Some businesses claim if the government seized the land through eminent domain, they would only be paid for the value of the land, and not for the value of the buildings on the land (Cowan, 2011). As a result, one newly rebuilt school in Bakersfield is expecting to only get half of its market value if it is seized through eminent domain (Cowan, 2011). The lack of plans has caused residents to become frustrated with the government, and as a result the state's high speed rail plan is beginning to fall out of favor with the public.

California's High Speed Rail Political Impact

High speed rail in California, like all high speed rail programs in the country was always a politically charged issue. Typically high speed rail is supported by the Democratic Party, and opposed by the Republican Party. And recently, the Republican controlled House of Representatives passed a spending bill that eliminated funding for California's high speed rail in Fiscal Year 2012, which threatens the projects survival (Lochhead, 2011). Political and popular support for high speed rail in California is

beginning to wane. The project has not yet started construction, but the estimated cost has already doubled, from $43 billion to $98 billion (Williams, 2011). Also, the length of the project has also doubled, while the ridership projections have been lowered. Voters are beginning to question whether high speed rail is worth it for a state that is already struggling financially. They argue that the cost of high speed rail could be spent on other programs, like public school programs, which has had $10 billion cut from them in the last three years (Cruickshank, 2011). Advocates for high speed rail point out that spending $98 billion on high speed rail is preferable to spending the $170 Billion that would need to be spent on highways and airports if high speed rail was not available (Cruickshank, 2011).

Other details of the high speed rail plan are just vague, which frustrates the public. There are no construction plans yet, and towns do not know if they will be affected, which adds difficulty to city planning (Cowan, 2011). The financing for the project is also unknown at this point. The project was expected to be a combination of federal, state, and private funds, however now federal funds are drying up. Advocates for high speed rail say that the system will pay for itself; however critics are skeptical because of the high annual maintenance costs that would be required. Before the revised cost estimates and the revised construction schedule high speed rail had political support in California, with four counties approving tax increases to pay for high speed rail by two-thirds in majority 2008 (Cruickshank, 2011). Political parties frequently argue over high speed rail and major infrastructure projects. Democrats usually point out that high speed rail projects reduce congestion, carbon emissions, and provide an alternative to highway funding. Republicans argue that high speed rail is too costly, and the government cannot

afford the cost of these major infrastructure projects. Because of these reasons, large infrastructure projects work much better if money is allocated up front, because without upfront funding the money is too unreliable, as future funding cannot be assumed after new elections.

China's Infrastructure, Socioeconomic and Political Benefits and Costs

Table 4. Infrastructure in China (at-a-glance)

ADVANTAGES	DISADVANTAGES
Projects are built quickly	Emphasis on speed, not safety
Government does not need public support for infrastructure projects	Socioeconomic impacts are not studied before project begins
Few environmental regulations	Environmental damage
Funding is more secure	Excessive spending on infrastructure projects contributed to inflation
Projects are symbols of national pride	There is a reluctance to delay or change a project once it begins.

Building large infrastructure projects in China rather than the United States has both its advantages and disadvantages (see Table 4). In China, because of the communist governments' power, they can build huge infrastructure projects quickly, and without worrying about public support. Funding for these projects is typically more secure than in America, because everything is financed through the government. Additionally, the central government does not need to worry about voters voting them out of office for poorly planned or poorly executed infrastructure projects. This enables government officials to move 1.4 million people without relying on the relocated peoples' votes at a later time. Another advantage infrastructure projects have in China is that they can be

built much faster than an equivalent project in America. Because there is no environmental protection agency or eminent domain lawsuits China's government is able to build their visions without having to wait decades for these types of issues to be sorted out. China is able to spend a huge amount of money on these projects, because the projects keep citizens employed, and employment helps reduce social unrest. China spent a huge amount on infrastructure projects (high speed rail mostly) after the economic downturn in 2008. China was able to maintain its high annual growth, partly because the money the government spent on infrastructure replaced the missing foreign capital. However, the excess stimulus money caused rapid inflation, a problem that China is now trying desperately to control. Building infrastructure in China is also preferable to building in the United States because the large infrastructure projects in China are used as a symbol of national pride. This helps these projects because it maintains support for the project both within the government and with its citizens.

However, building large infrastructure projects in China does have disadvantages. The biggest issue lately has been safety. Because the communist party has all the political power in China, they are able to build infrastructure projects quickly. Projects are set up intentionally with ambitious goals, and it is important for local party leaders to meet these goals in order to impress their party superiors. As a result, completing the projects quickly, rather than safely, is the top priority. Also, because these projects are showcased by the central government early on, there is reluctance to change plans, or slow down the pace of construction. This has become an increasing problem in China, with the high speed wreck in Wenzhou killing 40 people, a collapsing escalator in a new Beijing subway station killing one, and four bridges collapsing in one week in various

cities in China (Johnson, 2011). The Chinese, who once viewed the rapid pace of expansion positively, are now wondering if they have built things too fast. The amount of time between the planning of a project and the execution is small, which leaves little time to reconsider, especially because revising plans could delay the project. The speed and the "move forward at all costs" mentality has plagued the Three Gorges Dam project and China's high speed rail plans. Despite environmental concerns, the Three Gorges Dam project still progressed, and it continues to face a variety of the anticipated problems. China's central government commits to massive infrastructure projects so quickly that proper time is not taken to study and review all the impacts the project would have to the population and environment. Instead, government officials focus on the benefits, and ignore the risks. When these risks are large enough, such as the migration issues with Three Gorges Dam, it can cause social unrest, which threatens the communist party's control. Also, since these projects are all promoted as projects of great national pride for China, accidents cause national embarrassment, and make the communist party look incapable. When accidents do happen, the government discourages questioning of the accident. Instead, leaders stick to the party line by promising a full investigation, the results of which are often not released to the public. Corruption is also more prevalent in China than the United States, and this contributes to safety concerns, particularly on the high speed rail project. Some fear that corners were cut during construction, and inferior materials were used in exchange for kickbacks (Moore, 2011). The ability for projects to be built unsafely with weaker materials is clearly a disadvantage to building infrastructure projects in China.

American Infrastructure, Socioeconomic and Political Benefits and Costs

Table 5. Infrastructure in America (at-a-glance)

ADVANTAGES	DISADVANTAGES
Projects are generally built safer (with large factor of safety)	Projects are more expensive, and use more material
Environmental and socioeconomic issues are minimized in the design phase	Projects take longer, often years in the design phase
Projects can be stopped if they are too expensive	Legal battles can extend projects, and make them more expensive
Private funding is an option	Projects require public support from voters
	Projects start before funding is committed

There are several advantages to building infrastructure projects in the United States instead of China (see Table 5). The first advantage is more time is spent reviewing the design, and construction plans, which helps make the projects safer. There are also more quality control checks, and construction is generally held to a higher standard than it is for most infrastructure projects in China. There is also a legal process, which, in some ways ensures large infrastructure projects develop slowly. This allows the designs to go through numerous iterations, as environmental or eminent domain issues can take years to work out. These concerns help show the consequences of the infrastructure projects on the environment, and on various communities. By spending extra time looking at the expected results of the infrastructure projects allows the government to build the projects with the least impact to communities or the environment. While this does make the project take longer, it also allows re-evaluation of the project, which lets leaders and the public review whether they are getting the best results with the least associated cost and risk. Also, because America is a much more litigious society than China is, safety issues take precedent over construction schedules. This makes

infrastructure projects in America engineered and built with a large factor of safety. This approach costs more, but it protects the project from weak materials, and other unforeseen threats that could hurt the projects safety. Equipment in America is also tested much longer, in order to make sure the equipment functions and has been designed properly. When problems do arise in American infrastructure projects, the problems are analyzed and measures are put in place to prevent them. Investigations in America are usually transparent and honest, with full reports made available to the public when they are completed. This is because public support is often needed for infrastructure projects in order to continue to get financing. In China, the problems are either ignored, or downplayed by the censored media. American infrastructure projects can also rely on private funding instead of government funding, something China has not pursued yet. Private funding in America allows large infrastructure projects to be built with little money up front. This also allows private investors to raise tolls and other rates without having to fear retribution from voters during elections. These public-private partnerships have become increasingly popular in recent years because federal and state budgets are stretched.

There are, however, many downsides to building infrastructure projects in the United States instead of China. For one, the projects move much slower. China was able to build its 1,318 km Beijing to Shanghai railway in only 38 months ("Premier Wen Boards", 2011). In the United States, it would take that long to do an environmental impact assessment, and it would be months after that before construction ever started. These projects take a while to get a final design, because there are many designs looked at and analyzed before construction ever begins. This takes time, and ends up making the

overall project more costly. It does, however make the end result safer, and more reliable. Also, projects in America typically have a large factor of safety, which means they are often at least twice or three times as strong as they technically need to be. This makes the infrastructure last longer, and makes it less susceptible to material and other defects, however it does make the projects take longer and use more material, and both of these make the projects more expensive than they would be otherwise. Also, in the America there can be lawsuits before construction even starts, which could delay an infrastructure project for years. Infrastructure projects can also be a divisive politically in America. Traditionally, the Democratic party supports infrastructure spending, and the Republican Party typically opposes funding. Because large infrastructure projects are multi-year projects, it is important to allocate funding upfront for the projects. Without the funding in place, projects can never be fully executed without having sustained, bipartisan support, which happens rarely in today's politics. This is what has happened recently with the California high speed rail project, which will not receive any federal funding in fiscal year 2012.

Conclusion

As shown above, building infrastructure in each country has its trade-offs. While American infrastructure takes longer, it is usually safer, and when accidents do happen they are examined, and measures are put in place to prevent them. China's infrastructure, though typically less safe, is able to be built much quicker, and the projects usually do not struggle to receive funding. The political and social impacts of infrastructure projects in each country also differ greatly. While China is able to move millions of residents

through dam building, they also create numerous problems due to the relocation. Also, when problems arise in Chinese infrastructure projects, they are usually not transparently addressed, which can cause the public to turn against their leadership. This can have an affect politically, as people distrust their government, and feel they have been lied to. In America, infrastructure projects try to minimize their socioeconomic and political affects, however large infrastructure projects frequently become politicized. Each country has its advantages and disadvantages when it comes to building large infrastructure projects, and perhaps each country could learn from the other when it comes to building major infrastructure projects.

CHAPTER 5

CURRENT ECONOMIC ISSUES FACING CHINA

Question from Dr. Bauer

Dr. Bauer wanted to know about the economic issues China was facing in October and November, 2011. At that time, China was struggling with a real estate bubble on the verge of collapse, numerous bad government loans, and high inflation. Each of these issues, and the government's response to them, are explored in this chapter.

Response

China is currently facing a number of economic issues, and they are struggling to contain them. The real estate bubble is on the verge of collapsing, and there are a massive number of loans made to local Chinese governments that might not be repaid. On top of that, inflation has remained much higher than China's government would like, and the credit markets are tightening. All of these issues are connected, and a crisis in one area could cause a crisis in all of the others. If this happens, China's growth will falter, and the effects would be felt worldwide.

Real Estate Bubble

One of the largest issues affecting China economically is the huge real estate bubble. The real estate market has grown drastically in the past few years because there are very few investments better than real estate in China. Savings accounts in China will give a "guaranteed negative real return on investment" because the government controls inflation. As a result, someone with a savings account would probably get an interest rate

of half the rate of inflation ("Wharton's Joseph Gyourko", 2011). There are few other investment opportunities other than savings accounts in China – the other investment options are not high yielding, and are not available to the general public. As a result, "many Chinese see real estate as one of the few – if not only – secure, long- term investment options they have." ("The Taxman Cometh", 2011) With the Chinese people becoming wealthier, real estate prices have been driven up by speculation. For example, in 2010 real estate investment was $500 Billion USD, double what it was in 2009, due to a combination of stimulus spending and rampant speculation in the real estate market (Miller, 2011).

The real estate market is estimated to be 12% of China's gross domestic product (GDP); by comparison it was only 6% - 7% of America's GDP in 2008 when their real estate market floundered ("Wharton's Joseph Gyourko"). Fixed asset investments in China (which includes real estate, among other things) are approximately 70% of the GDP, by comparison it was in the high teens in the United Kingdom and the United States in 2006 and 2007 ("The Taxman Cometh"). This means that real estate and other fixed assets in China are a much larger percentage of GDP, and therefore play a much larger role in their economy.

In addition to the actual real estate market, the various industries tied to real estate make up a huge percentage of China's GDP. About a third of all buildings completed by the construction industry are built for private housing. These construction companies comprise of 5% of China's GDP, and they buy 40% of all steel and lumber in China ("Wharton's Joseph Gyourko"). China's local governments also depend on land sales for roughly 34% of fiscal revenue, although in some areas the percentage is much higher

("Out of Reach?", 2011). For example, in Shanghai, land sales are over half of the city's fiscal revenue ("Out of Reach?"). In addition to land sales, property taxes also provide local governments with a substantial portion of their revenue ("The Taxman Cometh"). Because so many aspects in China's economy are tied to the real estate market, any downturn could spread instability throughout their entire economy.

Real estate prices in China the past ten years have grown drastically, but they have skyrocketed in the last four or five. From 2000 to 2010, prices were up 225%, with a 60% increase in the price the last three years alone ("Wharton's Joseph Gyourko"). In large cities, real estate prices have grown more: in Beijing real estate prices rose 800% from 2003 to 2010 ("Wharton's Joseph Gyourko"). In Shanghai, home prices are up to 20 times annual income ("Wharton's Joseph Gyourko"). The price to income ratios are highest in large cities, which means the largest population is the most strained. The cost of housing is so high that middle income families can no longer afford a typical housing unit ("Wharton's Joseph Gyourko").

In the past few months (from July to October, 2011), China's central government has enacted several measures they feel will slowly deflate the housing bubble. One of their major efforts to slow the real estate bubble is to build more affordable housing units. China plans to increase the percentage of affordable housing units from the current level of 7% of the real estate market to 20% in 2015 by building 36 million new affordable housing units ("Out of Reach?"). However, property developers so far are unwilling to build these affordable units because the existing ones are not profitable yet, and they are often built in the outskirts of cities, which makes them undesirable ("Out of Reach?").

The reluctance of property developers to build affordable housing units limits the government's ability to respond to the real estate bubble.

Another way the Chinese government is trying to reduce the property bubble is by instituting anti-speculation policies. One of the anti-speculation policies they have put in place is trying to limit the total number of houses Chinese citizens can buy, and raising the down payment required for a second home to 50% - 60% ("Wharton's Joseph Gyourko"). China has also increased mortgage rates on second homes as well, as much as 10% higher than benchmark rates ("The Taxman Cometh"). Local governments have also recently put property taxes in place (a new phenomenon in China) in order to further discourage real estate purchases purely for investment purposes ("The Taxman Cometh"). China's central government is also increasing the amount of capital banks must have in reserves, which limits the amount of money they have to lend to property developers ("The Domino Effect, 2011"). The fact that China is willing to act and put policies in place to slow the real estate bubble should be seen as a positive sign for worried investors, because it shows China is trying to prevent the bubble from bursting by trying to slowly deflate it instead.

The good news for investors and China's government is that these policies seem to be working. Lately, the real estate market seems to be slowly deflating, not collapsing. For the first time in three years property prices in Beijing were flat month to month in July, 2011, and 30 other cities reported lower or flat prices, and some of the large developers have reported a slowdown in demand ("Wharton's Joseph Gyourko"). However, in October, 2011 there has been more of a sell-off in the largest cities like Beijing and Shanghai. For example, in Beijing 53 of the 90 new residential projects have

started to offer discounts ("Housing Market Close to Turning Point", 2011), and some speculate that prices could fall by as much as 50% if the government keeps up its measures (Chang, 2011). Investors are now concerned that this could trigger a real estate sell-off, as property developers undercut one another.

Fortunately, in Chinese citizens need to put large down payments to buy houses, so there is a large amount of equity in the real estate market which will help protect the economy. However, many investors worry about how leveraged China's real estate market is, and worry that any downturn in real estate prices could expose a multitude of economic problems. In theory, the large down payments required to buy houses in China should be a cushion, as long as there is not a lot of hidden leverage ("Wharton's Joseph Gyourko").

Bad Loans to Local Government

Another major economic concern in China is bad loans, mostly from loans made to local governments. China's government, in order to respond to the global economic crisis in 2008, pumped 14 trillion RMB ($2.2 trillion USD) in loans into their economy, and most of these loans are due within a few years ("The Domino Effect"). China spent this money so they could maintain their high growth rate, even when economies worldwide were faltering. Of the stimulus money, there is still 8.5 Trillion RMB ($1.3 Trillion USD) outstanding for local government debts ("The Domino Effect"). China in the past few years has expanded lending; in 2008 bank lending was 111% of GDP, in 2010 it was 140% of GDP ("The Domino Effect"). Much of this lending went to infrastructure and real estate projects, which helped contribute to the real estate bubble.

Some analysts feel China has a lot of bad debt, however the amount of bad debt is unclear, which concerns investors. One auditor estimated that, at worst case scenario, local government debts could be as much as 30% of China's GDP ("The Domino Effect"). However, China has officially reported that non-performing loans (NPL's) make up only 1% of all government loans ("The Domino Effect"). Many of these NPL's (approximately 20%) were established by local governments to fund infrastructure projects, and it is unlikely that the projects will be able to repay the loans (Green, 2011). The central government in October, 2011 cancelled some the largest infrastructure projects, in order to "prevent a banking meltdown" ("The Domino Effect").

However, some rating agencies, like Moody's, have warned that the amount of non-performing loans could be much higher than China's government is acknowledging, and could be as high as 8-12% of total lending ("The Domino Effect"). Some analysts have reduced China's growth estimates because they are expecting more NPL's associated with local government debt ("Sovereign Debt", 2011). Officially, China's local government debt is about $1.7 trillion, or about 27% of the national economy (Barboza, 2011a). However, this local government debt figure does not include the central government debts for huge infrastructure projects, such as high speed rail – these are separated and kept on off-balance sheets (Barboza). Recently, shares of large Chinese lenders have been downgraded, because the outstanding debts are feared to be much larger that the government acknowledges (Barboza). From August 1st to October 7th 2011, the four largest Chinese banks have lost over $1 billion in market value ("Chinese Banks: The A-share Team", 2011). Recently, Chinese banks have continued

to post high profits, profits which skeptical investors believe are built on “a mountain of bad debt” (“China’s Financial Regulators: All Change”, 2011).

The ratings company Fitch estimated there is a 60% likelihood that China’s banking system could run into trouble within the next two to three years (“The Domino Effect”). If a government bailout of local governments’ NPL’s is required, the bailout figure would be significant. If the NPL ratio rises to 15 - 30% it could require a bailout of 10 - 30% of China’s GDP to support the economy (“The Domino Effect”). Investors are scared because the percentage of NPL’s could very likely be in this range: Credit Suisse suggested in June, 2011 that the NPL’s ratio is probably around 25% (“The Domino Effect”). However, there is a great deal of uncertainty with these figures because it is hard to estimate the off-balance sheet liabilities that China does not report. Some ratings agencies estimate these additional hidden liabilities could be as large as 10 Trillion RMB ($1.6 Trillion USD) (“The Domino Effect”). Another major unknown in China’s economy is hidden leverage in the system, which is unknown to investors at this point.

The best way for local governments to raise money to pay back the NPL’s is to issue bonds, which are new to China. However, the bonds local governments issue are largely tied to real estate and land values. As a result, these loans (and local governments’ ability to repay them) are especially susceptible to downturns in the real estate market (“The Domino Effect”). This means if land values do not increase, local governments will not be able to raise money to repay bondholders, which could require additional capital from the government.

However, there is some cause for optimism. The central government has required banks to raise their reserves sixteen times over the past eighteen months, to 21.5% of their deposits currently ("The Domino Effect"). China has also raised interest rates three times this year, which makes borrowing more expensive ("The Domino Effect"). These efforts will help improve the bank's balance sheets, giving them more equity if there is an economic downturn. China has also terminated some their largest infrastructure projects, such as high speed rail. The high speed rail project alone caused China's rail ministry to borrow 1.9 Trillion RMB ($300 billion USD) (Bradsher, 2011). The central government owns shares of the four biggest Chinese banks, and recently announced they would purchase more shares in order to give them extra capital ("Chinese Banks: The A-share Team"). So far, the central government's investment is minimal, but it again shows that the central government will act when it is necessary to help the economy, which has given hope to some worried investors.

Some do not believe this issue of bad loans presents as big a problem as other investors fear. With China's growth expected to be around 9% this year, their debt to GDP ratio is much less serious as it would be with smaller growth. Even with China's growth between 5-7%, their debt would still shrink, as long as new borrowing was reigned in ("Sovereign Debt"). Also, China does not need to worry about foreign creditors because Chinese debt is already difficult to obtain. And, in comparison to other developing countries China's public debt is not that large: it is far below both Brazil and India's, and China remains very creditworthy ("Chinese Banks: The A-share Team"). In addition, China has over $3 Trillion USD in foreign reserves, which it can use to make these debt payments without stressing their economy ("Sovereign Debt").

Inflation

One of the major economic issues in China, one which affects all the others is the high rate of inflation. The inflation rate in China is set by the central government, in 2001 it was 6.1% in September, 6.2% in August, and 6.5% in July, which was a three year high ("China's Inflation Rate Eases Further in September", 2011). Inflation is high in part because of the same stimulus programs that flooded local governments with excess cash, which funded real estate development and expensive infrastructure projects

China has taken several measures to try to fight inflation, like raising interest rates and raising the amount of capital banks must keep in reserves ("The Domino Effect"). These anti-inflationary measures make borrowing in China more rare, and more expensive. The measures seem to be working, with most economists expecting inflation to slow down over the next few months. The key will be to reduce the rate of inflation slowly; if anti-inflation measures are too successful it could jeopardize loans to developers and builders ("China's Economy: Give us an A", 2011). As the Chinese government puts these anti-inflation measures in place, businesses are having difficulty finding credit because both bank reserves and lending rates are high.

The major driver of inflation in China recently has external commodity prices. These prices are surging, and affecting all developing countries. Food costs worldwide in August, 2011 were up 11.5%, the sixth month in a row of a 10% or more increase ("Inflation in China", 2011). In those months the food costs were high because of poor weather, which had reduced the supply. Again, the Chinese government has tried to lower food prices nationally by increasing the supply of pork, vegetables, and other basic foods. Some of these measures have worked: in October, 2011 food prices fell

significantly, which helped ease inflation ("China's Inflation Rate Eases Further in September").

However, the high inflation rate in China could be okay, for several reasons. According to some economists, if China's growth continues to be above 8% in 2012, inflation above 6% is okay (Green). For developing countries, China's inflation is not so bad; it is much lower than India and Brazil's, which are 9.7% and 7.3%, respectively ("Swaps Show Chance of Cut", 2011). Another reason inflation could be manageable is that the government does not need to be concerned with foreign creditors, and Chinese debt is still difficult to obtain. In addition, there is some evidence that the Yuan appreciating at such a high rate could be positive for China, and that China's government, "seems to be close to officially admitting that the Yuan's appreciation has more pros than cons. This contrasts with their previous reluctance to publically justify any appreciation" an economist at Societe General recently stated ("Inflation in China"). Having the currency appreciate would, "reduce costs of both imported and non-imported goods, because a stronger currency puts downward pressure on all tradable goods that are influenced by world prices" ("Inflation in China"). Because of these reasons, the central government might not want to reduce inflation too much, as the current level seem to be sustainable, as long as no other economic collapse pushes inflation to unmanageable levels. However, there is a growing concern that there could be another economic collapse (perhaps in the real estate bubble, or with non-performing loans associated with local government debt), which could drive inflation above manageable levels. The central government has stated a desired inflation rate of 4% in 2011, however it does not appear that they will be able to reach that level ("Inflation in China"). Part of the reason

is the excess money in the market slows the effect of the government's anti-inflationary measures.

Credit Markets Tightening

In order to respond to all of these issues, China has tightened credit markets. In the past few years China's central government has been very generous with lending, freely giving loans out to both local governments and sate owned enterprises. These measures were partly responsible for the aforementioned property bubble, and China's inflation. In order to both deflate the property bubble and reduce inflation China has tightened the credit markets. The government has frequently raised the amount of reserves banks must carry, to 21.5% of reserves, which gives the banks less money to lend ("The Domino Effect"). There is a concern that small and medium sized business will not be able to get loans from banks as easily, and the large underground lending market could collapse. In China, loans are usually only given to large state owned enterprises or projects that are backed by local or central government. It is difficult for small and medium sized businesses to get capital, so they are forced to rely on underground lenders. For the underground lenders, getting capital to lend is easy – the same lack of investment options that contributed to real estate speculation make underground lending attractive, and even more attractive since the government has enacted measures to control speculation in the real estate market. Underground lending in China is huge, estimated to be 10% of GDP, according to UBS bank (Barboza, 2011b). The interest rates underground lenders charge is extremely high, sometimes as much as 70% (Barboza, 2011b). Many companies and local governments also invest in

underground lending, and in some areas more than 90% of households are invested in some sort of underground lending (Barboza, 2011b). These underground lenders can also be affected by the real estate market downturn, because much of their lending is, "either secured against property, or invested in it" ("China's Economy: Afraid of a Bump", 2011). There is fear that if China's growth falters, the large underground lending market could follow, and that could make capital for small and medium sized businesses even more difficult to obtain.

This fear of slower growth could be justified, as China's GDP grew 9.1% in the third quarter of 2011 - the slowest pace in two years ("China Stocks Drop", 2011). In addition, foreign direct investment in China was 7.9% in September, 2011 - the slowest pace in three months ("China Stocks Drop"). China's measures to fight inflation and deflate the real estate bubble could also hurt China's growth in the near future (however it will tame the real estate market, and give the government more control over inflation) ("China Stocks Drop"). As long as China can contain these crises, their economy will probably be okay and they will not need an economic bailout.

All Connected

It is important to see how all of these economic issues in China are connected and how taking measures to combat one problem affects all the others. For example, in order to combat the worldwide economic downturn in 2010, China introduced a large stimulus program, which allowed China to maintain its high annual GDP growth. Much of this stimulus funding was spent on real estate and major infrastructure projects. The spending on real estate allowed property developers to build more homes than there was demand

for, with prices kept artificially high because real estate was increasingly used for investment purposes. The stimulus funding spent on costly infrastructure projects has been financed by local governments issuing bonds tied to real estate, which also helped fuel the real estate bubble. Many of the large stimulus projects were leveraged on bank credit, and not all local governments will be able to repay these loans. If these local governments are not allowed to raise capital by selling land, or if the land values do not continue to rise they will not be able to pay off their loans. And, because the amount of outstanding debt Chinese banks have is unknown, and the amount that banks are leveraged is also unknown, investors are getting worried and they are lowering China's growth estimates. These lower growth estimates worry other investors, which could lead to the downturn they originally feared. Combine all of this with China's efforts to tighten credit markets means that there will be less money in China's economy. Underground lending is also a large part of China's GDP, and any decrease in growth or restrictions on lending could cause a number of both legal and underground loans to go bad, which could require a bailout of up to 30% of GDP ("The Domino Effect"). Any downturn in the real estate market could also trigger the collapse of the underground lending market, because so much of the funding is backed against property. If there is a banking crisis in China, other countries could flee, and the effects would be felt worldwide.

Why it Matters to US and Europe

These issues could all have a disastrous affect on America and Europe's economies, as well as all other economies. China and the rest of the world economies are very connected. China holds the largest amount of foreign reserves at over $3 trillion

USD, and Europe is trying to convince China to buy a large portion of the debt from the bailout of Greece ("China Refuses to Commit to EFSF Amid Greek Concerns", 2011). China has also contributed a lot of the world's economic growth in the past few years, at 19% in 2010, and an expected 24% of worldwide growth in 2011 (Miller). The entire worldwide economy, already struggling with major economic crises in Europe and America, would be in even worse shape if China begins to struggle. For the past few years, China's growth has been one of the few positive aspects in the world economy. Also, America has sold $92 Billion in goods and services to China in 2010, and if China's real estate market declines there will be less demand for steel, cement, etc., which would affect the world's commodity market and all global trade (Miller). This could send a ripple effect across the world, as investors would be afraid of China's downturn, and US and European companies would be even more hesitant to create jobs and spend money. This would be the last thing America needs, as unemployment has remained high, and has not shown many signs improvement. Recently, President Barack Obama met with Chinese President Hu Jintao and urged him to let the Yuan appreciate, China, however responded that a rise in the Yuan would not fix the problems in America's economy (Barkley & Meckler, 2011). Mr. Hu is correct; less than 3% of American personal consumption spending is on products that are "made in china" (Hale & Hobijn, 2011). Even for items that are "made in china", only about 1.2% is the cost of the imported goods, meaning that over half of the money spent on goods "made in china" goes to services in the United States (Hale & Hobijn). If American leaders want to force the currency issue with China, it could inadvertently push them into an economic downturn that would hurt all economies, even America's. Both inflation and global

exports have started to slow in October, 2011, and China is very unlikely to let their currency appreciate when they could be in the beginning of an economic downturn. If they did, it would hurt economies worldwide.

The other economic concern for China (and the rest of the world) is the Eurozone crisis. China holds a quarter of its reserves in euro assets, and China needs to protect the strength of the euro, and Europe in general, because they are their biggest trade partner (Buckley, & Chiang, 2011). The concern over the Eurozone crisis has caused Chinese exports to grow at their slowest pace in seven months in September, 2011 (Buckley & Chiang). This, combined with all of the above mentioned issues create a perfect storm that China will need closely monitor in order to contain. All economies need each other, and it is in all of their best interest to help each other out in any way they can. With so many issues, all connected, there is a valid reason for investors, both in China and abroad, to be concerned.

The Chinese Government's Power

The Chinese government has a tremendous amount of power compared with the governments of European countries, or the United States. The communist party in China not only controls all aspects of the government, it also yields a tremendous amount of influence over the economy. The China's economic policy has recently been described as "state capitalism, which tries to meld the powers of the state with the powers of capitalism" ("Special Report: State Capitalism," p. 3). The Chinese government is the largest shareholder in the 150 biggest Chinese companies, and government owned companies make up 80% of China's stock market value. Each of these businesses is

heavily influenced by the communist party. The communist party has, "cells in most big companies – in private as well as the state-owned sector – complete with their own offices and files on employees" ("Special Report: State Capitalism," p. 9). Governments in Europe and the United States do not have anything equivalent to the communist party's power in China. In both Europe and the United States citizens are offered choices for leadership - in China the selection process for government leaders is done behind closed doors. After a decision has been made by the communist party, the party members publicly support the decision, and rarely make criticisms. In the United States and Europe there is frequent public debate, and discussions over government policies. Because of these frequent debates between competing parties, decisions in the United States and Europe take a great deal of time. Legislation in the United States can take years of review before it is enacted. In China, the broad and overwhelming power the communist party has allows decisions to be made very rapidly. And, because most businesses are controlled by the government the policies are able to be enforced by local governments or communist party leaders in Chinese companies relatively easily. China's government has much more influence over the economy compared with America and Europe. As one author explained, "the invisible hand of the market" that America and Europe support, "is giving way to the visible, and often authoritarian, hand of state capitalism" ("Special Report: State Capitalism," p. 5).

Interview with an Executive Regarding Business in China

I interviewed a Senior Executive at a technology based manufacturing company about the risks of doing business in China. He said there were several risks when doing

business in China. One of the greatest risks is the possibility of the Chinese government requesting a “joint venture” partnership with their company and a government owned Chinese company. If this happens, there are two options - either you agree and lose intellectual property control and control over management decisions, or you resist and State Owned Enterprises (SOE’s) boycott your products, essentially blacklisting your business in China. However, even without a joint venture control of your business’s intellectual property is always in jeopardy when doing business in China. Intellectual property is often stolen, and the legal system in China is “undeveloped” in a Western sense, and it depends heavily on arbitration. Arbitration in China is not necessarily neutral, and the courts often rule against foreign companies. China is also facing rising labor costs and high severance pay. Currently, this is not a major issue however as wages rise and length of employment rises it will become a greater issue. There is also a shortage of talent in China. “Job hopping” is prevalent, and culturally expected. After spending money to train employees, the employees often leave the company for higher paying positions elsewhere. These are the risks of doing business in China, however companies still go there in droves because they have over a billion potential customers. China will continue to play an increasing role in America, and the rest of the world’s economy. They have obstacles to overcome, but they have the ability to respond quickly and efficiently.

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APPENDIX A

LINKS TO d.SCHOOL MATERIAL

- Bootleg Bootcamp: http://dschool.stanford.edu/wp-content/uploads/2011/03/BootcampBootleg2010v2SLIM.pdf

- Wallet Exercise
  - Website: https://dschool.stanford.edu/groups/designresources/wiki/4dbb2/The_Wallet_Project.html
  - Worksheet: https://dschool.stanford.edu/sandbox/groups/designresources/wiki/4dbb2/attachments/e1005/TheWalletProjectB%26W2012.pdf?sessionID=3fb8b7005f8633db2428777539e6ed82160da2f5
  - Completed Worksheet (example): https://dschool.stanford.edu/sandbox/groups/designresources/wiki/4dbb2/attachments/add94/WALLETFILLEDOUTWORKSHEETS.pdf?sessionID=3fb8b7005f8633db2428777539e6ed82160da2f5
  - Facilitators Guide: https://dschool.stanford.edu/sandbox/groups/designresources/wiki/4dbb2/attachments/d5c91/Wallet%20Facilitators%20Guide2012.pdf?sessionID=3fb8b7005f8633db2428777539e6ed82160da2f5

- Gift Giving Exercise:
  - Website: https://dschool.stanford.edu/groups/designresources/wiki/ed894/The_GiftGiving_Project.html
  - Worksheet: https://dschool.stanford.edu/sandbox/groups/designresources/wiki/ed894/attachments/6cfe1/TheGiftGivingProjectB%26W2012.pdf?sessionID=3fb8b7005f8633db2428777539e6ed82160da2f5
  - Completed Worksheet (example): https://dschool.stanford.edu/sandbox/groups/designresources/wiki/4dbb2/attachments/65f86/GiftGivingProjectFilledOut.pdf?sessionID=3fb8b7005f8633db2428777539e6ed82160da2f5
  - Facilitator's Guide: https://dschool.stanford.edu/sandbox/groups/designresources/wiki/ed894/attachments/0132b/GG%20Facilitators%20Guide2012.pdf?sessionID=3fb8b7005f8633db2428777539e6ed82160da2f5