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A RISK MANAGEMENT STRATEGY TO HEDGE PROJECTS AGAINST COST ESCALATION CAUSED BY PRICE INFLATION

أستراتيجية إدارة الخطر لحماية المشاريع ضد زيادة التكلفة الناتجة عن تضخم الأسعار

By

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Abstract

The purpose of this research is to find out the most reliable hedges that the project manager can use to avoid or reduce the risk of inflation on projects. Inflation is an invisible, economical, financial and social problem that lay beyond the control of any traditional project manager. Afterward, the only option available to the project manager is hedging from the consequences of inflation to assure the success of his/her project.

To hedge from inflation, a comprehensive Literature review was done to explore what is available in the other countries in terms of hedges. In the next stage, data collection methodology is via conducting interviewees with some expert project managers who have international experience and regional experience as well. After that, compare the interview findings with the literature review to come up with conclusions and recommendations.

From the data analysis, it is found that the most project managers prefer to hedge from inflation from the planning stage. However, the most reliable hedge is the fixed price contract which belongs to risk "Transfer" method as per Taylor (2003) risk management strategy. The other most reliable hedges are doing proper cost estimation, understanding project variables and complying with the organization risk taking strategy.

Some limitations found in the research are the difficulty in approaching expert project managers who have international experience. Also, the risk management stages and methods definition can easily change the result of the research. Last but not least, the time given to complete the dissertation and the unavailability of sufficient fund to support the research financial has limited the research result.

Keywords

Inflation, Hedges, Risk Management, Planning, Response and Monitor.

الخلاصة

الهدف الرئيسي لهذه الدراسة هو إيجاد التحوط الأكثر مصداقية التي يمكن لمدير المشروع ان يستخدمها للتخفيف خطر التضخم على المشاريع. التضخم هو مشكله غير مرئية و اقتصادية و مالية و أيضا اجتماعية تواجه أي مدير مشروع بطبيعة الحال. بناء على، الخيار الوحيد الموجود لمدير المشروع هو التحوط من هذا الخطر ومن تبعاته للتأكيد من عدم تأثيره على أعمال المشروع بنجاح.

للتحوط من التضخم، تم عمل دراسة مستفيضة للبحوث السابقة بهذا المجال لاكتشاف التحوط المختلفة في العديد من بلدان العالم. وفي المرحلة التالية من البحث، كانت عملية جمع المعلومات البحثية عن طريق مقابلة شخصية لعدد من مدراء المشاريع المحليين ذوي الخبرات العالمية. و الخطوة التالية كانت عن طريق مقارنة نتائج البحث في البحوث السابقة مع نتائج المقابلات الشخصية للوصول الى نتائج و توصيات شاملة.

من ناحية جمع المعلومات، تبين انه معظم مدراء المشاريع يفضلون التحوط من التضخم أبتداء من مرحله التخطيط للمشروع. تم التوصل الى ان التحوط الأكثر تفضيلا من ناحية المصدقية هو العقود ذات السعر الثابت التي تنتمي الى التحوط الانتقالي الترحيلي حسب ما جاء بالبحث المقدم من تايلر (2003). التحوط المفضل التالي من ناحية المصدقيه هو التقييم المالي الدقيق و من ثم الفهم الجيد للعوامل المتغيره في المشروع و من ثم أتباع مدى قدره الشركه على أخذ المخاطر.

بعض الصعوبات وجدت خلال هذا البحث مثل صعوبة الوصول الى مدراء المشاريع المناسبين ذوي الخبرات العالمية. أيضا، كانت هنالك صعوبة في تعريف مراحل اداره المخاطر و أساليبها قد تتمكن بسهولة من تغيير نتيجة البحث. وفي النهاية، الوقت الممنوح لانهاء هذه الدراسة و عدم توفر الدعم المالي المناسب قد قوضت نتائج هذا البحث بشكل ملحوظ.

الكلمات المفتاحية: التضخم، التحوطات، أدراه المخاطر، التخطيط، التصدي و المراقبة.

Chapter One

1. Introduction

1.1 Aim Of The Research

The aim of this study is investigate the most and least reliable hedging techniques to protect projects from cost escalation caused by inflation.

1.2 Research Objectives

This study attempts to:

1. Address the hedging techniques those are used locally or internationally to hedge projects against the risk of cost escalation caused by Inflation. Literature review will be the bases for this objective.
2. Find out the hedges used by some expert project managers to hedge their projects against inflation. This information to be collected through formal interviews.
3. Compare the hedges used in reality to the ones found in literature review and highlight the most reliable among all.
4. Address the Most and least preferred hedges to protect the project from cost escalation that can be caused by inflation.

1.3 Organization Of Dissertation

This study consists of six main chapters. In **Chapter One**, an executive summary will be provided. Then, the statement of the problem of the research will be presented. Next, the aim and the objectives of the research will be outlined. Following that, some background on the topic of the research will be presented to introduce the reader to the problem of the research. **Chapter Two** will open with the objectives of the literature. More than 73 different references are used to enrich the research. The literature review will address the problem of inflation worldwide in general and then its effects on Gulf Countries Council

(GCC), in particular the United Arab Emirates. Later, the literature will try to figure out techniques that can be used to deal with inflation as risk. **Chapter Three** shows the structure of the research methodology used. The selected data collection method is the interview. In the next chapter, **Chapter Four**, the interview findings will be presented with data analysis. In **Chapter Five**, the discussion will take place to compare between the literature review findings and the interviews findings. The most reliable hedges will be highlighted and the least reliable hedges will be highlighted as well. The findings will be confirmed by a survey. Besides, the gaps in the currently used techniques to hedge projects against inflation will be discussed. Also, in this chapter, a risk management strategy will be developed based on the study findings. In **Chapter Six**, the conclusion and recommendations will be presented. Likewise, further recommendations on how future studies on the same topic of the dissertation to be spotlighted.

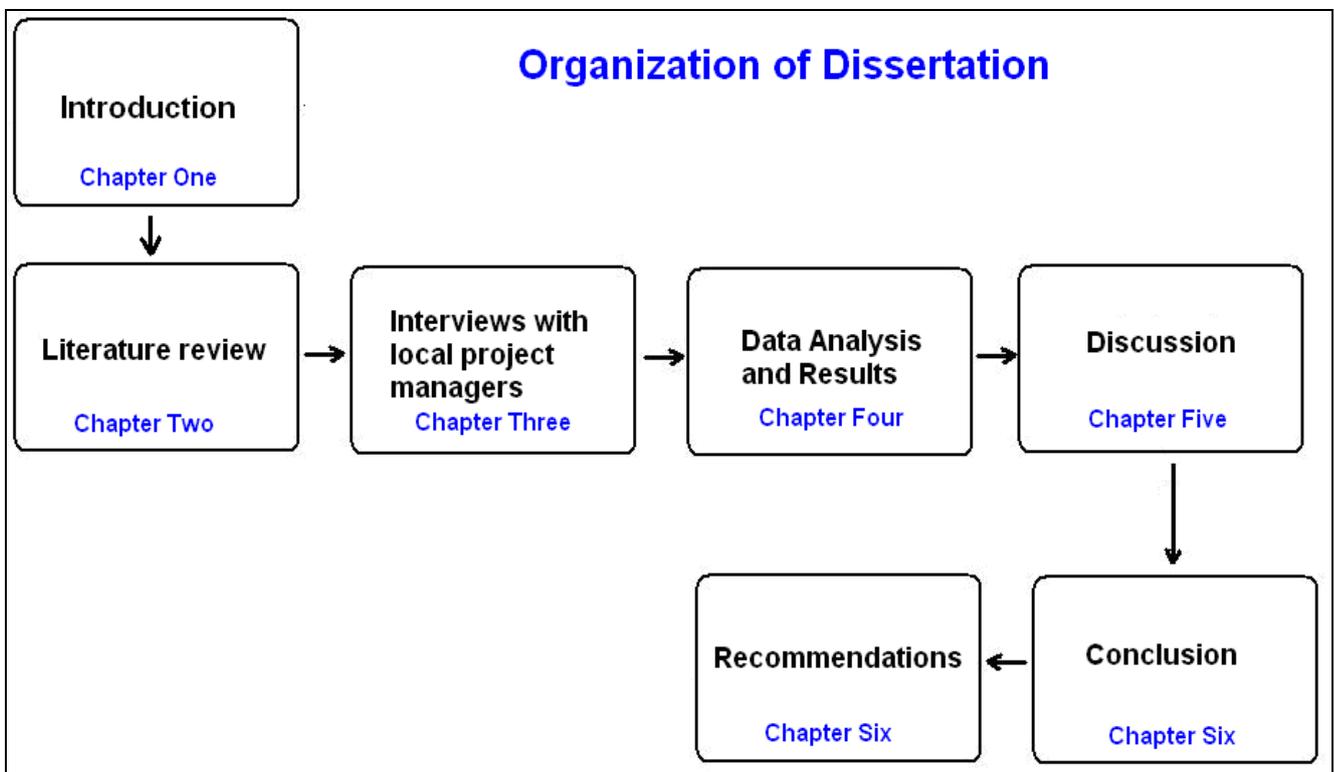


Figure 1: Organization of Research shows what each chapter will be about.

1.4 Background

The economical phenomena called inflation can be simply defined as “increase in the price”. Although this is a simple definition, it is considered as a one of factors that can lead to catastrophic consequence if it not considered in a project risk assessment. At the situation of inflation, it does not mean that all prices of all goods are going up but the overall price trend is an upward trend. Generally, people dislike inflation because it means they have to pay more to thing they buy. In other words, the inflation is seriously affecting their social living standard, financial capabilities, savings and their retirement plan. The increase in price that we are discussing is a slight percentage that can be felt, but a considerable price increase can go up 100% to 300% in a single year. Such situations have been seen many times in the last century.

Cost escalation in projects happen because of many reasons. Some of the reasons are increase of resources cost caused by inflation, underestimating the project requirements, inadequate planning and the unpredicted technical difficulties during the project life time. However, inflation in projects as what as discussed before happens in projects because of the external surrounding environment. Besides, project manager became reactive to this risk although he/she has the right to become proactive in responding to the problem. There are other factors contribute to cost variation in projects but most of them are manageable and monitorable. The reason that inflation does not belong to the previously mentioned kind of factors is that inflation comes to the project from the surrounding environment to affect the project where the project manager has no direct control.

In his article about Dubai, Ulrich (2009) argues that entrepreneurs can do bad investment despite the absence of inflation in the economy. He further states that inflation can cause distortion on a massive scale throughout the economy. He adds, although psychology clearly plays a role in stimulating a bubble, but only price inflation enables it.

In some instances, inflation went out of control and led to something called Hyperinflation where the price increases crazy in hourly bases. One example of Hyperinflation occurred Germany in 1920s. In 1922, the inflation reached 100% per month and it reached approximately 6000% by the end of the year. In 1923, things went seriously out of control and the prices went up 1,300,000 (yes one thousands and three hundreds millions times). At that time, people in restaurants had to eat their meat quickly before the price of the meal they selected from the menu rises. People in Germany stopped counting the money once they bought some thing. Instead, they tied the cash together in wads and started weight the slug of cash. For example, it may take three kilos of cash to buy a loaf of bread! During those hard times, the wives of German workers used to wait for their husbands outside the factories or organizations, where they used to work, until they finished their daily shift to take their daily wage. They were not bad wives, but they tried to be efficient by taking money directly from the husbands and running to the market to purchase the goods that the family needed before the price increase. Similar situations of inflation, but less in severity, happened in Ancient Rome, Mexico few years ago and still happening in Brazil.

Inflation is not always bad as most of people think. Inflation has some advantages along the side of the disadvantages. Slight inflation is used by the government to stimulate the economy from time to time. The stimulus happens by printing more money and dumping it in the economy without the making the public notice. The government dumps the money in the economy by purchasing goods and services with the new money which in turns starts driving the market up. This way of governmental interference into the economy is called the Momentary Policy. Another advantage of inflation is that it allows the borrowers to pay their loan cheaper.

The UAE is in the list of the affected parties. For the UAE, as a developing country, inflation is a nightmare to the local economy and business. The UAE faced high inflation in the last three years (between 2006 to 2009) which caused many projects to be suspended or cancelled. Projects with the value of tens of billions of Dirhams got cancelled as the contracting company or the owners failed to accommodate with the rocket raising prices of the materials, land, technology and the labor wages. Some of the studies refer to the inflation in the UAE to the excess of money supply to the market. In addition, other factors, which play a role in causing the inflation, are inflation caused by trading partners and higher domestic spending supported by higher monetary growth which in turn causes the price rise.

A proper plan for the risk management to this price rise definitely would be a useful tool to the project manager in hedging (proactively) against the risk of inflation. A risk management plan (or strategy) has to be planned very well. Then actions to respond to inflation shall be addressed clearly.

As it is shown in this research, several of hedge actions may be considered by the manager in the planning phase, response phase and the monitor phase. In this study, inflation as a risk will be analyzed in more details from different dimensions. Additionally, a risk management strategy will be highlighted based on the study literature findings. Moreover, this research will try to figure out most of international practices or strategies that are currently used by project managers to manage the risk of price escalation due to inflation. Then, the research to find out the hedges used by many project managers, who are currently working in the UAE, by interviewing them. Finally, the most reliable hedges will be addressed.

Chapter Two

2. Literature Review

2.1 Main Objectives Of The Literature Review

In this section, inflation as a concept will be studied. Subsequently, the consequence of inflation on economy and projects in particular will be explored. After that, hedges or techniques used worldwide to protect projects against inflation consequences on project cost will be reviewed. This will be used in the next chapters for comparison with current practices for the UAE project managers.

2.2 Literature Review Process

Inflation as a topic is very wide and complicated since it is an old economic problem. Therefore, much literature is found discussing the hedges that works with inflation. To make it easier to understand the difference between them, all collected arguments and opinions are loaded to a MS Excel program in one sheet. Then, all related literatures are grouped in single table. This additional step helped the research to manage all the literatures and provided an easier approach to build the literature review chapter. Appendix A shows more information on this process. It was found that Taylor's (2003) risk management strategy is the clearer and practical strategy to build the research on. As it will be noted later, the collected literatures are grouped under Taylor's risk management methods. It is worth to mention that, in section 2.6 "Risk Management, the names of the hedges will be written in **Bold**. This step is done to allow the reader to easily determine the text transition from one hedge type to another.

2.3 Introduction To Inflation

2.3.1 Definition Of Inflation

Inflation is not a result of today's financial crises or the previous economic disasters. The phenomenon of inflation has historical background. From the research conducted by Delson (1992), it shows that inflation can threaten the usefulness of money and affect the life in the society. Delson stated that high interest rate was possibly the reason for inflation that led to financial regulations in ancient times. Such regulations on inflation or interest rate charges appeared about 3750 years ago in the Code of Hammurapi of Babylon. Also, Aristotle in his Treatise on Ethics objected to the concept of interest on that money cannot be able to grow by itself. Deslon added that in 1578 a person called Jean Bodin gave five causes of inflation. Jean said as much as we increase the rate of money we lose that amount by it. Therefore, the great inflation in France had happened which caused a general poverty in France economy. Moreover, Delson mentioned also that the inflation started in ancient Europe because the gold is made in South America and then brought to Spain and then shipped to the other European countries which increase the cost of the gold and silver themselves.

Recent evidence shown by McMahon (2008) suggests that the inflation is a well known phenomena in USA. As per the record, from 1913 till 2008, USA had an accumulated inflation of 2071%, Which means the prices of goods in 2008 were 21 times the prices in were 1913. In addition, he says that the USA suffered inflation in the last century except in the period of the Great Depression in 1920s. Figure 1 is showing how the inflation sharply went up in the last century in USA..

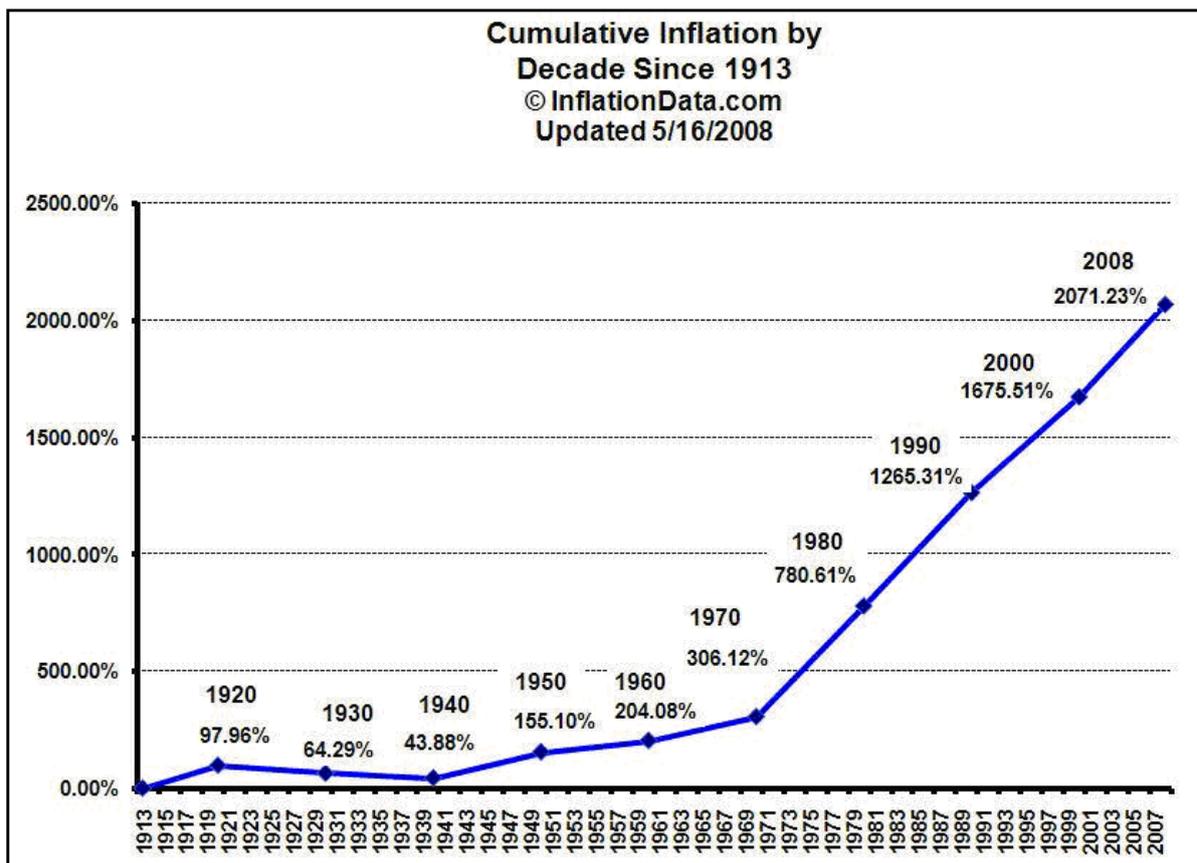


Figure 2: the accumulated inflation raise in USA from 1913

Previous study by Chang (2009) reported in his discussion to find out a dynamic effect of Monetary Policy that that in the last two decades, the world's countries saw price stabilization, but significant and persistent movements in asset prices. He also says that the effective control of inflation was noticeable in the last years however; there is a main question about instability of the financial system all over the world.

Another researcher called McMahon (2008) defines inflation as "rising in prices". He gave an example to measure the inflation by saying if a person went to a gas station or the grocery store and the things you buy cost more than last month, this is more precisely defined as "price inflation". McMahon also defined another term called disinflation as a slower rate of inflation once compared to the previous period of time. For example if inflation is 5% this month but it was 6% last month, then this is what is called disinflation.

McMahon also defines other related terms called “Stagflation”. Stagflation is a stagnant economy along with price inflation. In another way, stagflation economy is going down while the prices go up. Stagflation is harmful such as inflation. It causes price inflation and high unemployment and a disastrous economy.

2.3.2 Measuring Inflation

McMahon (2008) says that inflation is measured by an index called the "consumer price index" (CPI). He defines the inflation based on this index as the percentage change in CPI index from one year. COBANK (2010) issued an interview done with Todd Buchholz (Former White House Director of Economics Policy) under the topic “Assessing Inflation Risk”. In his answer to a question posed about the CPI as a tool to measure the inflation, he replied that "In the end the CPI is more important because that tells you whether businesses are able to pass on higher prices to consumers. So if businesses are charging more among themselves but ultimately the guy selling to consumers cannot raise his prices, then what you have is a profit to squeeze or an inability to make profits among producers” (pp. 3).

The CPI is very important once we talk about inflation. The CPI is the official measure of inflation in a country. However, there are other important indexes which are also used to measure or predict inflation. A governmental authority called Florida Department Of Transportation (FDT) (2009) defined the CPI, which also known as retail price index, as a weighted average of prices of a specified set of products and services purchased by wage earners in urban areas. This index is used to track the price of a specific set of products and services. It works as measure of inflation. The second index called the Producer Price Index (PPI) for Highway and Street Construction (PPI) is reported monthly by the U.S. Department of Labor’s Bureau of Labor Statistics. This index is derived from the

prices of materials and services used in highway construction. PPI does not forecast future inflation rates. The third index is called the Employment Cost Index (ECI) is based on the National Compensation Survey. This index measures the changes that are happening in every quarter in compensation costs. The compensation cost includes wages, salaries, and other employer costs for civilian workers.

2.3.3 Negative Effects Of Inflation

No doubt that many of us like to pay less for the good that he/she is buying. Besides, and based on this simple assumption, inflation over all is a bad thing to have. Williams (1980) concurs that inflation as one of the reasons to increase the unit cost of resources. Similarly, Baker (2003) states that one of the important factors in economic world is the way in which the economic history is now being put into a broader definition. He means the period of time from the early 1970s to the early 1990s. At that period of time, high inflation was seen in many quarters as the main problem. That got stood in the way of achieving greater economic success and in particular achieving lasting reduction in the rate of unemployment. In other words, inflation is disastrous and morally corrosive. Baker States that “It can destroy lives” (pp.2).

Arditi, Akan and Gurdamar (1985) view inflation in a negative way. Based on their research, they found that inflation is one indirect reason to have delays in construction projects. Inflation affects material prices and labor wages. They argue that the previous increase contractor’s financial difficulties and then lower the possibility the project become a success piece of work. Their survey result is shown in Figure 3.

Importance Scores and Relative weights of reasons for construction cost overrun.						
No.	Reasons for Construction Cost Overrun	Contractors		Public Agencies		Average relative weight, %
		Scores	Relative Weights, %	Scores	Relative Weights, %	
1	Increase in materials prices	110	21.61	165	24.55	23.08
2	Inflation	120	23.58	135	20.09	21.84
3	Difficulties in obtaining construction materials at official current price	63	12.38	100	14.88	13.63
4	Reasons that yield construction delays	59	11.59	94	13.99	12.79
5	Difficulties in cost estimates prepared by public agencies.	65	12.77	24	3.57	8.17

Figure 3: Reasons for construction project cost overrun. Inflation ranked the second top reason base on Arditi, Arkan and Gurdamar (1985) study.

As per COBANK (2010), Todd Buchhol state that the following once he had been asked about the hyper inflation if it can happen now after the financial crises happened in 2008. He said “With any economic phenomenon there are risks. I certainly can see the scenario where inflation starts growing, but then you have to ask yourself if that is the most logical case. I disagree with those who say that inflation is baked in the cake” (pp. 2). He also stated although the printing press of money was on overdrive, however there are people who destroy this money.

Grier and Kevin (2006) found in their research on inflation on Mexico that developing countries provide a good place to examine the real effect of inflation and inflation uncertainty. They found that inflation uncertainty significantly lowers output growth. Inflation uncertainty is higher at high levels of inflation. The direct effect of average inflation on output growth is estimated to be positive, but this is outweighed by average inflation’s positive effect on inflation uncertainty. As a result, the output growth is significantly lower.

On discussing the risk of inflation, Schaefer (1973) sees the inflation as real risk. He described the risk of inflation as the sweet poison of drugs, which despite the gradual

destruction they wreak on the power and decrease the ability to perform. Ellen (2009) agrees Schaefer. Ellen agrees with Schaefer that inflation is real risk and investors have to hedge against it.

McMahon (2007) draws another boarder of the negative side of the inflation. He sees it as a hidden tax by the government because the government borrows money from investors and then it spends the money. Then they pay it back with cheaper dollars. In addition, Dickens, Goette, Groshen, Holden, Messina, Schweitzer, Turunen, and Ward (2006) agree that higher inflation brings more frequent wage and price changes, higher search costs for goods. It also brings a greater uncertainty about the future path of wages and prices. Thus, increased inflation may also cause a misallocation of resources in projects or organizations in that region impacted by the inflation.

Grier and Kevin (2006) while they try to explore other researchers' models to understand inflation theory, they believed a positive, negative, or zero effect of trend inflation on output growth, depending on the specific assumptions done by the researchers. They said that some of the models they explored show that inflation reduces accumulated wealth, which in turn raises current savings, investment, and growth. Braun and Tella (2000) agree with Grier and Kevin. They found inflation will lower economy growth and inflation has a lower effect of inflation on welfare and growth. Additionally, they found that the increased inflation uncertainty affects investment and output growth by reducing the information of price movements and hinders long-term contracting, thus potentially reducing growth.

On the negative impact of inflation on economy or business, McMahon (2007) has a close understanding to the above. McMahon believes that one big disadvantage of inflation is the fact that it discourages lending by making loans too expensive and makes planning for

the future more difficult. He said "On a small scale lenders are the losers from inflation and borrowers are the winners but on a bigger scale the biggest beneficiary is the Government and the overall economy is the biggest loser. Other losers are those on fixed incomes and those who are priced out of the loan market." Schaefer (1973) adds one more negative point to the others points. Schaefer says inflation increases the damage done to the economic structure and the liberal social frame. It also poisons the social atmosphere and causes erosion of corporate self-financing capacity causing shifts in the distribution of capital and income that are not justified by actual performance and the pursuit of tangible values.

2.3.4 Positive Effects Of Inflation

On the other side of the equation, many papers see inflation as having a positive impact on economy. Schaefer (1973) again and Grier and Kevin (2006) all agreed there are many benefits of having a moderate inflation. To summarize their positive findings, they found that inflation variability has a positive effect on economic growth through increased savings considering that the interest rate increases with the increased inflation. During the period of uncertainty, risk adverse agents will tend to save more. Then, the savings will then translate via higher investment and then a higher economy growth. Another positive point is that the inflation has the power to produce the growth effects once inflation is unpredictable. Controlled inflation of 1-2% can assure full employment and economic growth.

Gtassman (2006) and McMahon (2007) see good news for the project or business that borrows money in an inflation environment. They see borrowers borrow valuable money and the number of dollars they must repay is fixed. Over the time the value of the money gets less and less. They called this way of repaying loans as "cheaper dollars". The

longer term of the loan, the longer the inflation has to work its magic. Dickens, Goette, Groshen, Holden, Messina, Schweitzer, Turunen, and Ward (2006) have positive take on inflation. A higher inflation in business environment fastens the adjustment of relative wages cuts. They argue that this benefits project organizations.

2.3.5 Summary

The above comparison between positive and negative effects of inflation by project companies is clearly summarized by Yescombe (2002). He said "inflation can be a friend or a foe to the Project Company in the long term—the financial model should be used to check whether a high rate of inflation is an optimistic or a conservative assumption and this risk reviewed accordingly" (pp. 87).

2.4 Inflation In The UAE

In this study, and as project manager, the aim is to understand the inflation in general and look for reliable strategies to hedge against the inflation that can be implemented in GCC in general and in United Arab Emirates (UAE) in particular. Therefore understanding how inflation works in the region will improve developing more effective strategies. Some papers have blamed these pressures mainly from weakening U.S. dollar, others on global shocks related to high food prices, local supply shortages related to rent, and demand shocks induced by large fiscal spending and an expansionary monetary stance imported from the U.S. through the dollar.

EFG HERMES (2009) shows in their report on the UAE economy and forecast for the next years' inflation that the inflation rates in the UAE in the last nine years in a chart. That chart, in Figure 4, shows how the inflation never rested in the last nine years. The same report claims that inflation to start rising again from 2011. Dubai as well as other emirates in the UAE has been affected as well because of the unexpected high inflation. Business Inelegancy (2009) claims that more than 50% of the announced residential and commercial projects due for completion between 2009 and 2012 have been either put on hold or cancelled. It was understood from the article that inflation of prices is considered as one reason for the project cancellation. Apart from that, Wikipedia (2007) sees project cancellation, where inflation can be one of the possible reasons, as a bigger problem. They say when a project is cancelled, business executives are really worried about the waste of resources. Wasted resources means less employment and then less growth, as a result.

The situation in the UAE is never better than other GCC countries. Decision makers feel uncomfortable with unpredictable inflation and some times uncontrolled rise of prices.

Nawach (2009) stated that the Central Bank of the UAE figures showed the projected rate in 2009 year could be the lowest CPI in 15 years after it reached 12.3 in 2008 and 11.1 in 2007. IMF (2009) justifies that inflation can happen as a result of the inflation happened in the trading partners and growth of the money supply, effect of currency appreciation and higher domestic spending supported by higher monetary growth.

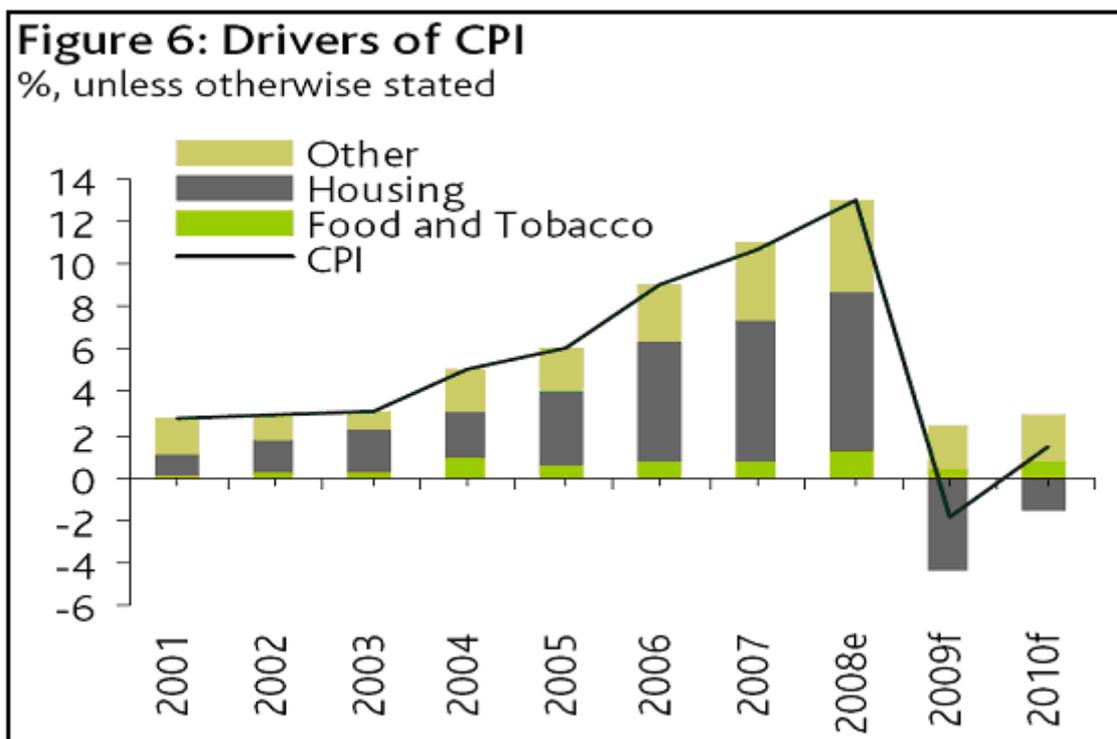


Figure 4: This chart represents the Consumer Purchase Index (CPI) for the UAE for the period from 2001 to the beginning of 2010. The chart showing how the index ingredients contribute to the CPI.

2.5 Inflation In GCC

While he was studying the significant risk that can affect GCC companies via a survey covered 65 respondent from different companies, El-Sayiegh (2008) found that inflation and sudden changes in prices ranked the first among the top ten most significant risks. Likewise, International Monetary Fund (IMF) (2008) states in their report that inflationary pressures have emerged since 2003 in all GCC countries. This puts inflation on the top of the agenda for policy makers in the region. The CPI index for GCC , and therefore inflation, accelerated dramatically during 2000's as shown in Figure 3.

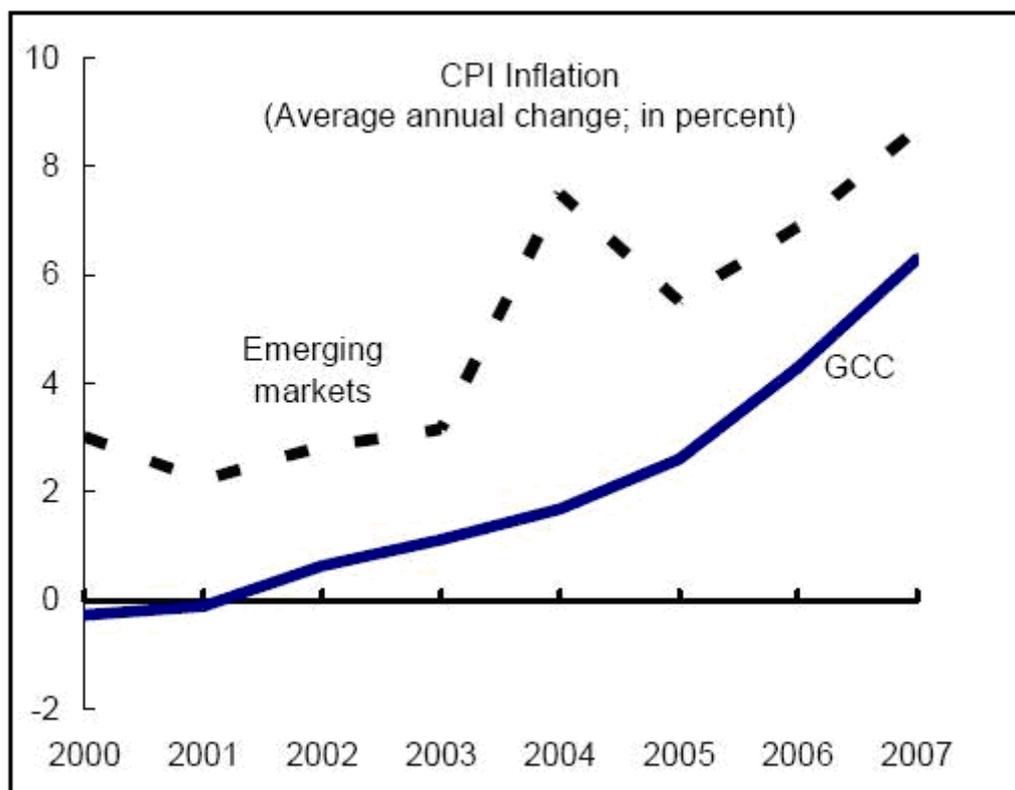


Figure 5: Inflation, measured by CPI index accelerated fast in the last years same as other emerging (developing) markets .

IMF (2009) finds that many foreign and domestic factors illustrate why inflation happens in GCC countries. For foreign inflation, it found that inflation in major trading partners appears the most relevant to inflation in GCC. An accommodating monetary policy helps the GCC countries to sustain inflationary pressures in response to higher inflation in

trading partners. They find fixed exchange rate systems poor in mitigating the effects of external shocks on domestic inflation. In addition to that, they find that exchange rate depreciation with major trading partners could reinforce the increase in import. As a result, it will increase the prices and the inflationary effect of external factors on foreign side. The U.S. dollar was going down recently which has drawn attention to the effect of nominal effective exchange rate depreciation on higher inflation at GCC countries. IMF (2008) concludes that in the long run, inflation in trading partners is the main factor affecting inflation in Saudi Arabia and Kuwait (GCC countries) with significant contribution from exchange rate. In the short term, positive demand shocks and excess money supply build more pressures on inflation. However, if the effect will be smoothen as real exchange rate and the money market reach a new equilibrium.

There is a strong evidence for a key role for money and the exchange rates in explaining the inflation process in some middle east countries such as Turkey, Iran, Pakistan, Mali and Japan. Moreover, it is found that countries' flexible labor policies have increased their dependence on foreign labor force, adding to the sensitivity of price levels to external factors (Lim and Papi 1997, Leo 2007, Sekine 2001, Khan and Schimmelpfennig 2006, and Diouf 2007). In other words, inflation in expatriates home country make must to GCC countries to increase wages to retain them here.

From the domestic factors side, it was found that they have reinforced inflationary pressures in response to external shocks. IMF (2009) states that oil resources have facilitated the buildup of international reserves to increase growth and spending. Government spending appears to have eased inflationary pressures in three GCC countries in the long-run. Binding capacity constraints lead, in general, to higher inflation in the face of government spending in the short-run. As it can be seen in Figure 4, more

oil revenue, the more is the governmental expenditure which means more money supply and then more inflation.

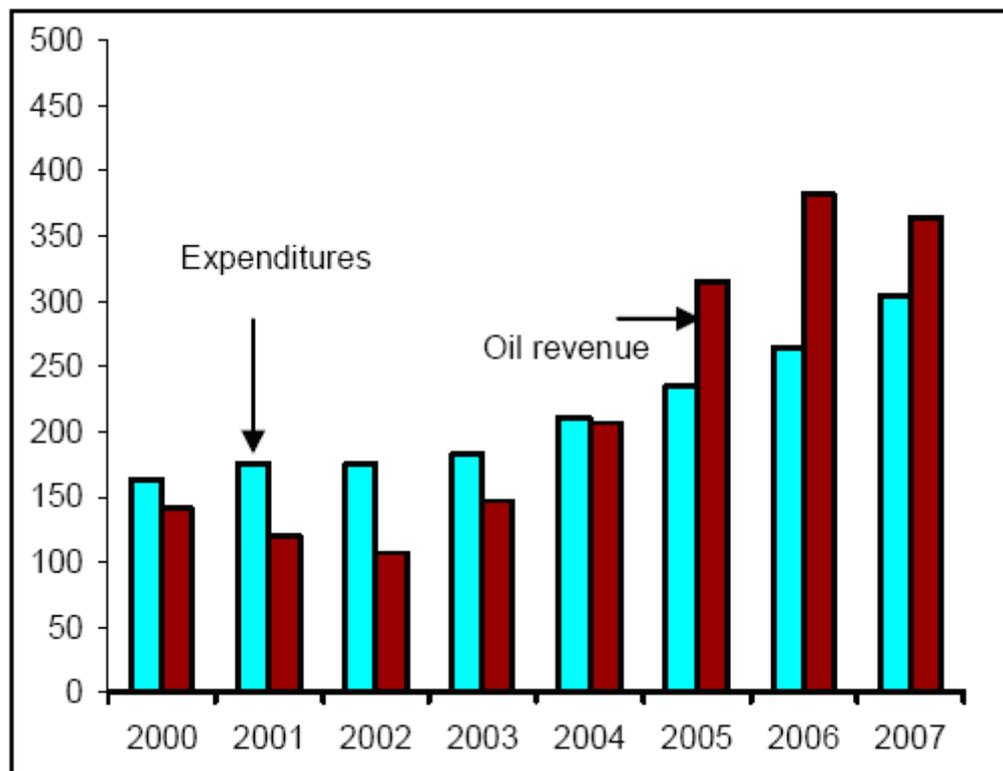


Figure 6: The higher the GCC income from oil, the higher their annual expenditure. As per the figure, there is a direct relation between the inflation rate and country spending.

Additionally, IMF (2008) also says that GCC countries have a very open trade system with outside the region. This justifies the sensitivity of the GCC country to external factors. Nevertheless, higher government spending and credit growth have successfully targeted supply-side constraints which slow down inflation. Thus, directing both public and private resources towards relaxing binding capacity constraints, capitalizing on the added windfall of oil resources, should be given the priority.

Understanding these driving forces is a key to adopt appropriate policies to maintain price stability. It also leads to assess the potential cost and benefits of the planned monetary

union in GCC countries with more unique processes at a lower cost. IMF (2008) suggests that to sort out the problem of inflation in GCC countries, governments have to adopt more flexible exchange rate regime to gain monetary policy independence, addressing supply bottlenecks, and containing government expenditures. IMF (2009) suggests that by targeting supply side, the increase in spending has eased capacity constraints. In addition, it moderated the price inflation in the long-run. In other GCC countries, government spending may not have efficiently targeted capacity constraints to determine the inflationary process in the long-run. In addition, they advice to increase the private investment in the United Arab Emirates by boosting private credit growth, which will help to build a capacity, further reducing price inflation in the long-run.

2.6 Risk Management

A Risk management strategy can be defined as the process to predict all possible risk that can happen during a project life time. Then, estimate the risk consequences based on history and experience and build a proper response plan to respond to these risks. Wang, Dulaimi and Aguria (2004) defined risk management strategy as “a formal and orderly process of systematically identifying, analyzing, and responding to risks throughout the life-cycle of a project to obtain the optimum degree of risk elimination, mitigation and/or control”. As a project manager or as a project management organization, it is important to understand what causes the inflation and what influences it. However, it is much more important to stay on the safe side, if they can, to eliminate or reduce the impact of inflation. This research tries to develop a risk management strategy that contains most reliable hedges from inflation’s consequences for both high and low inflation. AIRMIC, ALARM and IRM (2002) showing these three stages in Figure 5.

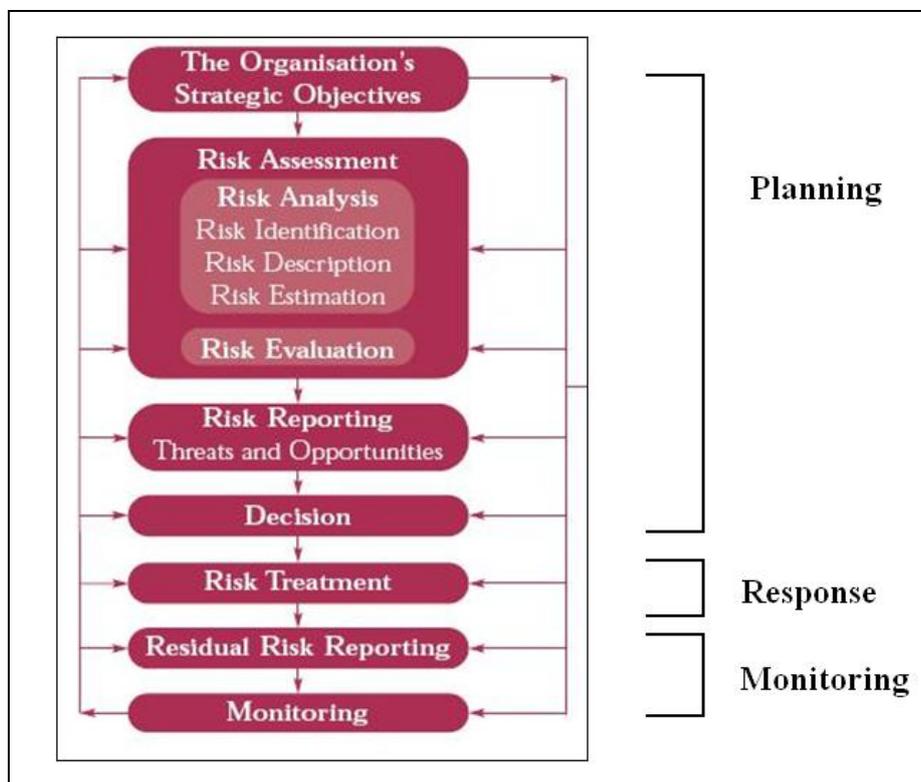


Figure 7: Planning, Response and Monitor stages of a risk management strategy based as captured from AIRMIC, ALARM and IRM (2002).

D.Choi, Kim and G. Choi (2009) think that with the rapid advance in product functions, the cycle of technological innovation is becoming shorter. In other words, it is difficult to meet various customer needs and it will be significant to impact on establishing corporate strategies. Companies need to identify, measure the diverse risk factors that might occur in the development process. Also, they have to create strategies and tactics to hedge against them. The researchers above claim that approximately 80 % of globally development projects fail while they are in progress and the other completed 20% took more costs and time than expected. This happens because project managers failed to recognize the risks and risk degrees in advance and they did not build a proper risk management strategy. On our topic, inflation, Kilian and Manganello (2003) state that fine usage of monetary policy is to safeguard against the danger of high inflation. The risk of inflation represents a real danger to policy makers. Moir (1976) agreed on considering inflation as a risk. He used an old saying that “business is the art of making irrevocable decisions based on inadequate data” has acquired greater significance than ever under the impact of today’s high inflation.

In his paper that studies the different risks that can face a project manager of infrastructure projects, Jun (2007) states economical phenomena such as the inflation should be considered as a real risk same as other technique, management and organization risks. Jun divided risks faces a project into five risk factors. They are Political risk, Economical risks, Low risks, natural risks and Social risks. He states inflation can be considered an economical risk along side with money supply reduction, the change of product market of project, contractor market material supply and labor market, exchange rate. AIRMIC, ALARM and IRM (2002) suggest to build a risk analysis process that can assist the effective and efficient operation of the organization by

identifying those risks which require attention. They divided the risk to a project into two main categories, external driven factors or internal factors.

They considered inflation risk as an external risk connected directly to the project cash flow and liquidity. Figure 6 shows how inflations, as an external risk, directly affect internal attribute of the project.

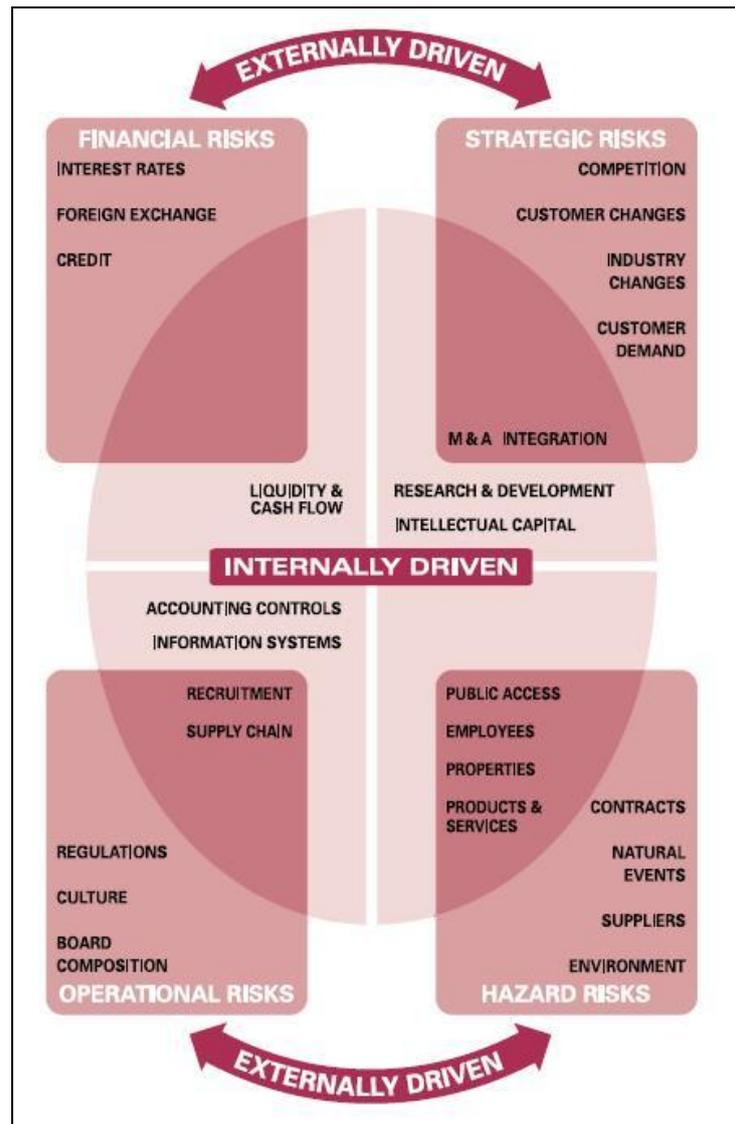


Figure 8: AIRMIC, ALARM and IRM (2002) show how inflations, as an external financial risk, is consider in their risk assessment diagram.

Classifying the risk is important step in planning the risk strategy. In their paper that studies risk in construction projects, Wang, Dulaimi and Aguria (2004) could categorize

risk into external risks and internal risks. Also, they classify risk in more detailed categories of political risk, financial risk, market risk, intellectual property risk, social risk and safety risk. In addition, they classified them in three levels: country, market and project levels. The research has found this classification useful in portraying the influence of one risk on the others and in prioritizing the mitigation measures for each of the risks. Country level risks are seen as a function of the political and macroeconomic stability. Inflation is a risk which prevents this stability. Kwak and Dewan (2001) add that risks can be classified into visible and invisible factors. It was found that inflation is an external and invisible driving force represents a risk to projects.

2.6.1 Taylor's (2003) Risk Management Strategy

As a project engineer in an international oil and gas company, it is found that experts in oil and gas divided the risk management starting into three mandatory stages. The first stage is planning the strategy by predicting and evaluating the risk consequence. The second stage is to find out the proper response to avoid or transfer or reduce the effects of the anticipated risk. The last stage is to develop a process to monitor the risk and control the whole strategy. Taylor (2003) also divides the risk management strategy into three stages: Planning, Response and Control and Monitor. In each stage, there are different hedging methods. Figure 9 shows the diagram for Taylor's Risk Management Strategy. Therefore, Taylor's risk management strategy considered in this research study since it is the closest to the common risk management strategy used in the industry. Taylor's Risk Management Strategy will be used to categorize the hedges that will be found in the literature review and in the data collection sections.

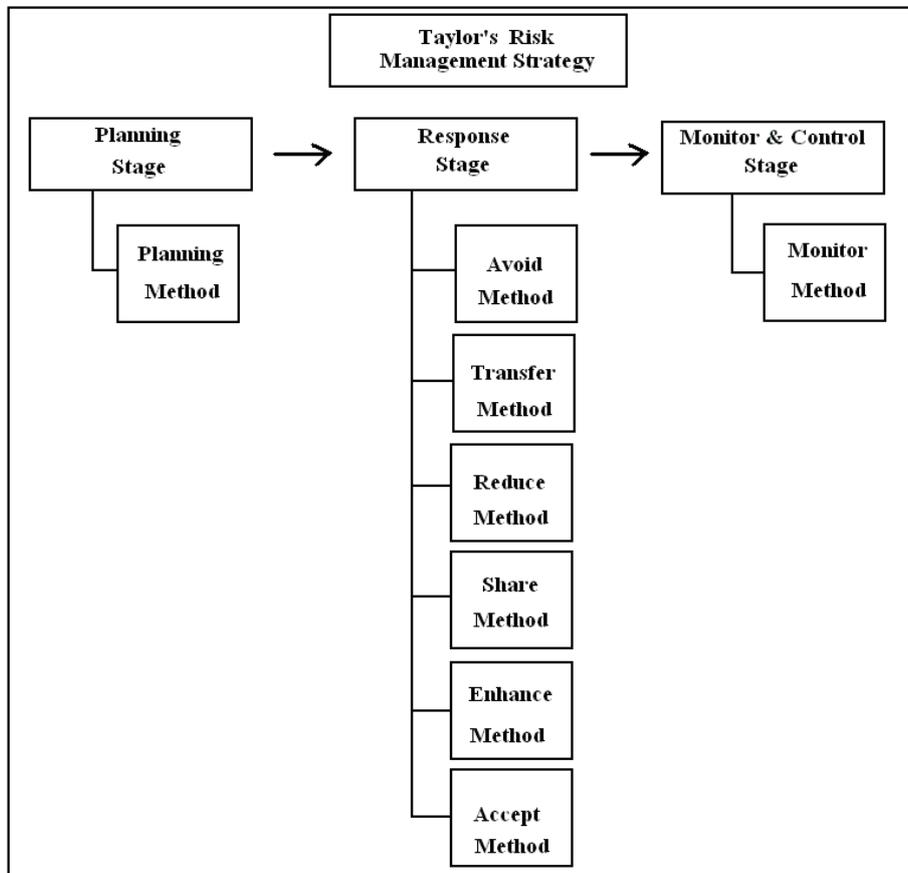


Figure 9: the diagram of Taylor's (2003) Risk Management Strategy.

2.6.2 Planning Stage

Risk management strategy planning is the first stage of developing a risk management strategy. It aids the company or the project manager to predict risks and risk exposure level before they got involved in the work. No doubt that the company will be able to determine whether to conduct the project in the planning phase if a company calculates the anticipated risk degree of a project. Moreover, the company can tell whether or not to stop the ongoing project. One of the main benefits is that the company can rank the risk degrees of a project and tell what needs to be done next. Planning stage is a hedge against inflation before the work starts. Moreover, risk planning stage enables the company to determine whether to manage the project intensively or not. Predicting inflation is not an easy task that can be done by some complicated equations. The following chart shows how it was hard to predict inflation in Saudi Arabia in the last 10 years. A difference of 5% or more is found between the predicted rate and the actual rate.

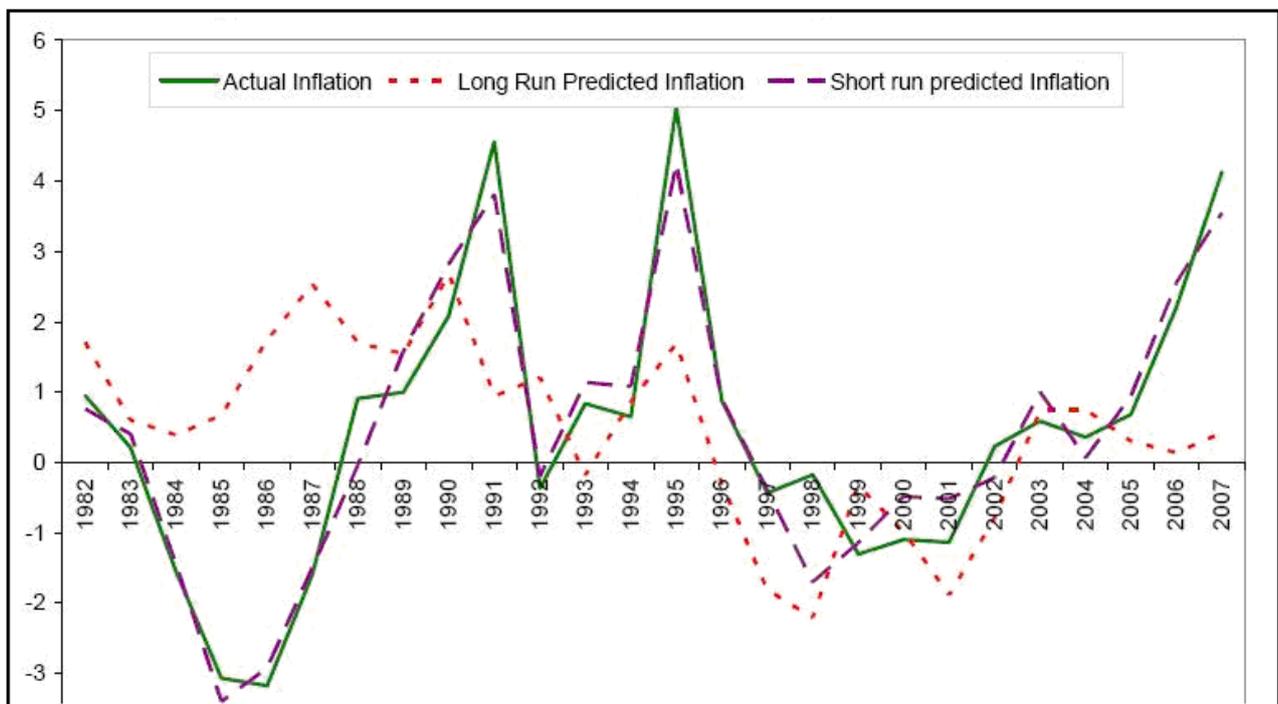


Figure 10: Expected inflation vs. actual inflation in Saudi Arabia. The chart captured from IMF (2009). The note here is how the inflation anticipation fails most of the times to predict short and long run inflation

People such as D.Choi, Kim and G. Choi (2009) and Kannadasan (2009) believe that determining the possible risk in the planning phase will help in reducing the time and the cost for project. They added, a project manager should consider the inflation carefully while taking decisions. Taylor (2003) advises to consider foreseeable and unforeseeable risks in the planning phase. Only foreseeable risks got addressed by project manager and they fail to address the unforeseeable ones. For that reason, project planning must include a degree of schedule, cost, and scope margin considering inflation. Jolayemi and Oluleye (1993) also agreed with the importance of addressing the inflation impact at the planning stage especially in industry or governmental projects. These kind of projects take up to 5 years or more to complete. The best practice is to make a careful project planning and time and cost control. They added, Cash-flow planning for a project fails if the inflation factor can be neglected in an environment of high inflation.

Moir (1976) sees that risk management planning should start with economic evaluation for the project. The planning should also be accompanied by a financial feasibility study comprehending the sources of the required finance, annual debt charges and cash flow statements with considering inflation rates. He says that while do the costing of projects, inflation accounting to be used which in turn will update the historic cost of assets either by correcting for inflation since the dates of purchase or calculating current values. It is found that inflation accounting approach has the advantage over historic costing. Inflation accounting is more realistic and has consistent application across the board. Although the advantage of inflation accounting brings more realism into commercial accounts, there is little doubt that business in general can benefit from the application of inflation accounting. It became necessary to take into consideration the expected rate of inflation

while preparing capital budget of projects. Mills (1996) believes that by taking the inflation to consideration, better decisions can be made.

Other risk planner keeps a special allowance for unexpected risk such inflation within the budget to be used once inflation hit the project. Mior (1973), Kannadhasan (2009) and Yescombe (2002) agree on the idea of special allowance in the budget for inflation. They argue that although it is difficult to choose discount rates for economics evaluation, the opportunity cost of retained earnings can significantly aid the managerial decision maker. They recommend the manager to consider these issues carefully when making capital budgeting decisions. Oxendine (2001) called this allowance as "Self Funding". This method is by setting aside money to pay for damages or by paying damages with current operating revenues, of which inflation can be one of the reasons. The problem with this method is lack of finance for most small businesses. Moreover, the project manager may need to put more efforts this fund properly. Above all of that, some persons or businesses asking for evidence of insurance may not readily accept a self-funded plan.

A different method is seen by Watson and Holland (1977). They see a different method to hedge against inflation in planning stage. They say that the most popular methods used to assess the profitability of a project are respectively the discount cash flow rate of return (DCFRR) and the Net Present Value (NPV). Jolayemi and Oluleye (1993) suggest including the inflation cost impact in the project indirect cost estimation. They say direct cost of a project activity is made up of the costs of supervision, inventory, insurance, capital, penalty for late project completion and bonuses for early completion.

Asian Development Bank (ADB) (2007) recommends in its report under the topic "Learning Curves: Project Cost Estimates" to rigorously consider

adequate resources, in both time and money, which will be allocated to overcome inflation impact. Kannadhasan (2009) again suggests that the company should raise the output price above the expected rate of inflation to hedge against inflation by maximizing cash in flow. While Wang, Dulaimi and Aguria (2004) recommend that the project manager get a Letter of Credit from local government to make sure their ability to live with inflation. Another solution is to ask the client to secure standby financing which sometimes reaches 100% to unexpected inflation. They also recommend to measure and price Bills of Quantities properly during bidding stage and to adopt as much as possible domestic product/labor to reduce cost to avoid expatriate wages inflation as result of inflation in their mother country.

2.6.3 Response Stage

As it was mentioned earlier in this study, a decent risk management strategy should have three parts. The first part is risk management strategy planning, which was already covered previously. The second part is risk management strategy response, which will be discussed now. Finally, the third part, which is the risk management strategy monitor and control part, which will be discussed later. Risk management strategy response differs from the planning stage. In this stage, the project manager or project organization takes further steps by becoming proactive to prevent his project or organization from getting affected by price inflation based on the project variables understanding. These steps may cost more money and needs to be planned well along with the original project plan.

Taylor (2003) defines risk management response plan very well. A project manager need to respond in a way that considers the risk type and consequences. Taylor adds, positive risks are those that can be exploited, as opportunities, for positive benefits. The response plan to negative risks may include: Avoid Plan, Transfer Plan, Reduce Plan, Share Plan, Enhance plan and Accept Plan. Each one of these will be discussed in the following sections while covering inflation as a negative risk.

2.6.3.1 Avoid Method

Taylor (2003) defines 'Avoid' method as hedging by changing the scope, schedule, or available resources of a project to avoid the risk. He adds, by relaxing the project requirements or obtaining additional information or bringing more skilled person, more risk can be avoided. From this simple definition, the easiest way to avoid inflation is do not make business that can be affected by inflation. Although this is easy to say, however, it is very difficult to do. Inflation is an international economic phenomenon that hits every where no matter the type of the project. In spite of that, partial avoidance can be done trying to "bypass" some of the scope of work that may be affected by inflation the most.

2.6.3.2 Transfer Method

Transferring the risk is another method for a project manager to deal with inflation. Taylor (2003) defines risk transfer as shifting the negative impact of a threat to another party. One of transfer hedges is insurance. Jun (2007) stated that international organization lists the project “**Insurance**” as the essential item of the construction contract. Kwak and Dewan (2001) agree with Jun. They tell that operating a business is extremely challenging especially without since there will be a worry about suffering losses due to unforeseen risks. They add, insurance especially for international projects help in transferring the risk of cost overrun, which can be caused by inflation, to the insurance companies. Omran (1991) and CDI (2005) suggest transferring of risks that go beyond the project financial capacity to an insurance party. They also say commercial insurance can be one of the most important ongoing financial investments you make in the life of your company. They argue that commercial insurance can protect the project manager from some of the most common losses.

One type of insurance that can be used to cover cost escalation caused by inflation is called Commercial General Liability Insurance (CGL). As per GEM (2007), CGL can include liabilities resulted from premises, ongoing operations, completed operations, products liability or personal and advertising injury to third parties. Cost escalation can exceed the allocated budget for the project. As a result, employees’ compensations may not be paid. CGL insurance can cover this as well. GEM (2007) says there is an insurance type called “Covered Causes of Loss”, which covers the project from all causes that led to make the project failed or loss. Oxendine (2001) talks about another kind of insurance that can be used to hedge from inflation influence called “Extra Expense” insurance. This insurance covers the additional expense of keeping the business going on

as nearly the same basis as possible. Another insurance type called “Professional Liability” insurance. Oxendine says about this insurance that it covers wrongful acts or calculations errors done by accountants, engineers, or other professionals, which may include inflation factor calculations at the project planning, stage. One more insurance type is called “Completion Risk” insurance. Omran (1991) stated that this kind of insurance covers a project against delays and cost overruns due to a very wide range of causes that may include unforeseen ground conditions such as inflation. This type of insurance is recommended for owners with limited financial resources or for projects funded by high bank lending.

In large scale projects, each party is responsible for obtaining their own insurance. These insurances may vary from compensation’s insurance, loss insurance or any type of insurance. However, there is an alternative method to provide insurance coverage for the entire project called “Controlled Insurance Program (CIP)”. Pella (2005) suggests that instead of each contracting party providing their own insurance, the insurance is provided for all parties working in the project under one consolidated insurance program from one insurance provider. Pella encourages projects manager to buy such kind of insurance because it will offer cost savings by buying insurance in bulk. Also, such insurance, provides a higher coverage limit and eliminates duplication and gaps in coverage. Additional advantage of CIP is that the volume purchase of insurance gives the owner or the prime contactor tremendous buying power resulting in lower insurance premiums. Moreover, with CIP, one centralized party is responsible for managing claims under this insurance agreement. However, managing the claims can be a challenging assignment since it required a significant level of effort and probably increase the administrative costs within the project. CIP also increases the project manager responsibility for implementing effective safety and loss control procedures.

In addition to the original one, CDI (2005) and GEM (2007) advice to have complementary insurance to extend the insurance limits. This is called “Commercial Umbrella”. It works as a secondary safeguard to protect the projects from being liable as a result from cost escalation. The umbrella can cover gaps in coverage under basic liability insurance. The umbrellas have a drop-down feature so that the main insurance is eroded or consumed by covered losses.

There are innovative ways to insure you business without being insured at the early stage. This method is called “Insurance Option”. Jun (2007) defines it as a kind of right that the holder can buy or sell an asset with fixed price at a certain time in future. It merges between the feature of financial options and insurance agreement. This method applied in China and found as a successful way for large-scale risk in infrastructure project. With the availability of this option, a project manager became able to sell some of the project’s asset at a pre-agreed prices to secure the required liquidity in the case of cost escalation caused by inflation. Oxendine (2001) talks about another innovative method of insurance called “Surety Bonds”. It is defined as a guarantee of the contractor performance. A project manger can ask the contractor to buy these bonds under the terms of a construction contract. If the contractor fails to perform as per the agreement, the project manager can get a settlement from the purchased bonds with the help of the bonding company. The bonding company to get reimbursed from the contactor at al later stage.

Once the loss or the damage happened in the project, the project manager will try to get his claims as soon as possible. Trying to handle the claim may violate the project manager duties under the insurance contract. CDI (2005) suggests making the insurance brokerage the first point of contact. This allows the insurance company to process the claim and conduct their investigation as quickly as possible. Normally,

projects are constrained with limited budget that cannot be exceeded. Although the insurance is a good option to consider to hedge against cost escalation, it incurs more cost. Louberg and Wattc (2008) confirm that insurance coverage means having less funds available for the investment itself.

One more way to transfer the risk of prices inflation is the “**Fixed Price Contract**”. The work covered by the contract is to be done whatever happens based on the pre-agreed contract price. Then, if inflation hit the prices, the project manager will not be affected. The whole risk got transferred on the contractor. Williams (1980) and Yescombe (2002) believe that at a high or unpredictable inflation rate, project manager have to demand fixed lump sum contracts. Fixed price contract is recommend for project manager to sub-contract but not to fail in its trap at volatile inflation period.

2.6.3.3 Reduce Method

The next method to response to inflation risk within the risk management strategy response plan is to reduce the consequence of the inflation on projects. Taylor (2003) says that if risks cannot be completely avoided they may be reduced (mitigated). In the methods that will be presented next, it is important to remember that most of these methods or techniques are commonly used by financial institutes or business managers to hedge from inflation. Project manager also manage budget allocated for the project during its life cycle, the same techniques can be used as well while considering each project's characteristics and limitations. The following techniques will be a way to keep the money value constant or growing over time with the existence of inflation.

Kibble and Pemtic (2010), National Treasury (2001) and Lunitel and Paudyal (2006) Consider "**Stocks**" as one way to retain the money purchasing power with time. They show that securities (stocks) have provided a kind of hedge against inflation over the long term and insulate tax-paying investor from inflation. From example, from the year 1926 till 2008, US stock market outpaced inflation by an average of 6.16% per year. This means stocks can over come the inflation effect of reducing the real value of money invested by the increase on the market value of the invested stocks. They argue that stocks may be less effective for hedging short-term inflation and more suitable for long term investors. Although stocks can be considered a kind of hedge, but the high volatility of the stock market exposes the investor to a higher risk. Additionally, it is well known that stocks market is a very sensitive to news and financial events. Martellini (2009) also recommends investment in stock as a hedge from inflation. However, he recommends the investment to be directed to infrastructure stocks. He argues that infrastructure stocks have low volatility, fairly inelastic demand and increase the investment real market value

as well. Weinberg (2003) argues that CPI Futures can be an inflation hedge. The suggestion is to sell the futures short if the investor thinks the inflation will go higher.

Another method to reduce the effect of inflation on project cost is a method called Real Estate Investment Trust securities (REIT). Nielsen (1988) defines REIT as a company that owns and operates real estate that producing income. There is a condition to be a REIT which is that the company must distribute at least 90 percent of its taxable income to shareholders annually in the form of dividends. Nielsen says a good selection of REIT can be considered as a superior cash returns and time-honored inflation hedge. Adrangi, Chartrath and Raffiee (2004) do not agree with this argument. They believe that REIT provides a limited hedge against inflation and REIT has declining equity component. Empirical studies support the hypothesis that the market for REITs and equities is integrated. Nowadays, REIT has a negative relationship with inflation.

Weinberg (2003) considers Treasury Inflation Protected Securities (TIPS) as an option to protect your money from erosion as a result from inflation. As the name suggests, these bonds are a type of Treasury security that offers protection from inflation. TIPS first introduced by the federal government in 1997 and TIPS adjusts the principal value based on CPI movement. Weinberg states that TIPS yields are not as rich as they were a few years ago but still they are not poor. One more advantage of TIPS is that the investor guaranteed to retrieve 100% of the original principal upon maturity.

Sondergeld (2004), Gtassman (2006) and Woods (2009) believe that TIPS pays interest semiannually and return the face value at maturity. TIPS are a conservative hedge against inflation. Farrell (2009) recommends TIPS as well. He says "If you would like an inflation hedge, there is an investment option that may provide a more direct correlation. It

is called a TIPS Treasury Inflation Protected Security, commonly referred to as TIPS". TIPS value increase at the time the CPI value increases.

Kibble and Pentic (2010) have middle view. They recommend TIPS as an inflation hedge. They state that TIPS generally is a good short-term inflation hedge since principal is adjusted for changes in the CPI. On the other hand, TIPS prices can be affected by real investment rates. And may not track inflation one-to-one in the short term. Weinberg (2003) supports the down side of TIPS. Weinberg says investor in TIPS has to pay tax for TIPS income.

Investor has two investment options. Either they invest their money in securities or give the money to an expert firm to do so. Glassman (2006) says that some "**Mutual Funds**" work as inflation hedge. The definition of a mutual fund is a professionally managed type of collective investment organization that collects money from individuals or other organizations to invest in stock market. Their investment in the stock market may pick stocks, bonds, other mutual fund or commodities. Weinberg (2003) agrees on that mutual fund is a kind of hedge. However, its performance as a hedge depends on what are there in the fund basket. The fund ingredients must be kind of hedges to make the over all fund a hedge from inflation. This present a limitation on mutual funds to work as a hedge.

Another technique is seen by Kibble and Pentic (2010) and Weinberg (2003) to reduce the effect of inflation. They state that short term and long term "**Bonds**" are a good hedge. Bondholder get benefits once the interest rate increases as a result of inflation. Bonds in general offer a periodical return based on the market and economy conditions. One type of bonds is called corporate inflation-linked bonds. These bonds pay monthly

fixed interest base (3% for example) plus inflation. Another researcher, Woods (2009), advice short term investor to invest in short term bonds. Another type of bonds called I-Bond issued by US government. Sondergeld (2004) think that I-Bond is a creative way to keep the money value over time. I-Bond pays interest in the form of fixed rate of return plus a variable inflation return. The earning are accumulated in the bond and paid directly every agreed period of time. HART (2009) discuss certain type of bonds. Hart mentions Inflation Linked Bond (ILB) and Capital Indexed Bonds (CIB) as good types of bonds that work a hedge against inflation. The good feature of these two types of financial derivatives is the quarterly adjustment. Both types move in parallel with the CPI.

Kibble and Pentic (2010) and Nielsen (1988) believe there is a negative side of the bonds. They say the bondholder got hurt by through falling bond market values and through erosion in the real value of interest payments and principal at maturity. Nielsen says “For 50 years, bond investors have suffered nearly continuous confiscation of their wealth because of higher anticipated inflation rates”. Wang (2010) also sees bonds in a negative way. They state that bonds are not perfect but they are good enough and the principal is protected by believing in USA economy. Gtassman (2006) says during the worst five-year period for inflation and that was between 1977 and 1981 when the CPI rose by 10%. On the other hand US bonds fell by an average of 1% a year. Gtassman argue that the good thing is that bonds are often seen as a safe haven. But in times of inflation the certainty of being repaid at maturity is cold comfort.

“**Commodities**” are perceived as effective inflation hedge because its return is positively correlated with inflation. Woods (2009) and Kibble and Pentic (2010) agree that commodities materials of production, such as corn, wheat and aluminum are hedges against inflation. Oil and natural gas are other commodity inflation hedges. They say inflation can not really put a huge dent in the demand for these products. Therefore, oil

and gas move higher with the increase of inflation. Looking at oil as one of the hedging commodities, a great investment choice is the United States Oil Fund (USO), a mutual fund designed to move in conjunction with the spot price of West Texas Intermediate light, sweet crude oil. Looking at the natural gas as another commodity hedge, the United States Natural Gas Fund (UNG) is a fund that designed to track the movements of natural gas prices.

Wang (2010) describes about gold, one of the hedge commodities, as the oldest hedge from inflation. Stockbridge (1939) also says that gold is the safest among all hedges. He recommends to at least considering gold mining shares. Woods (2009) agrees with both on the above authors. He adds that gold is a tangible asset that can't be easily produced. Gold is the great hedge from inflation. In years past, gold was very difficult to purchase however now owning gold is easy through out specialized funds. Farrell (2009) doesn't believe that gold is "a sure fire defense against inflation". Farrell argues that, if gold was a guaranteed hedge against inflation, then why did the price fall about \$600 from \$850 in the period between 1980 and 1999? He adds that gold is more as "financial panic" hedge. Weinberg (2003) agrees with Farrell negative point of view on gold as a hedge. Weinberg thinks that commodities in general and gold in particular are more volatile than stocks. The economic argument against holding commodities or commodity futures do not generate earnings or create business value need to be considered.

Other kinds of hedges are available for project managers, however, they look strange. Stockbridge (1939) sees "Productive Land" as a kind of commodity to hedge from inflation. This hedge is suitable for long term projects when such land is available. Lubove (1993) agrees with Stockbridge that land is a great inflation hedge. However, it is very difficult to liquefy the land any time. Wang (2010) says buying a house (or a

property) prevents the tenant from paying more because inflation has sucked away some of your purchasing power. In fact, the higher inflation is, the cheaper your housing becomes because the dollar amount remains the same for the life of your loan. Kwak and Dewan (2001) suggest some techniques that can help the project manager in reducing the inflation effects. One of the techniques is to receive contract payments in dollars, believing that the US Dollar will retain its value over time. Another technique to avoid inflation effect of currency exchange rate is by increasing local purchases.

One of the common ways to reduce the inflation consequences on project cost is to include inflation in the “**Contract Terms**”. By including an inflation based index such as CPI in the contract’s pricing formula, inflation can be mitigated. Yescombe (2002) advises project managers who have long term projects to develop agreements based on inflation index. Also, Yescombe suggest linking the Tariff in the project to inflation as well reducing any inflation risk mismatch between costs and revenues. National Treasury (2001) state that the risk of inflation need to be considered in any agreement. The possibility that the actual inflation rate will exceed the risk projected during the development of the feasibility study can be avoided by such action. The risk of inflation can be reduced by including an actual index based on inflation in the contract’s pricing formula. Williams (1980) believes that the introduction of an index based on inflation in the contract avoids future cost clashes. A contract price adjustment based on the inflation index recovers the escalation in costs. Delson (1992) also recommend using CPI or building your own index and use it in the project contract. On occasion, CPI is late and not really representing the increase in the materials prices used in a certain project. Then having your index based on CPI may be a good idea.

2.6.3.4 Share Method

In the risk management strategy, the second part was to create a response plan. As what has been explained before, the response plan can have different methods. One of these methods is share the risk. This means the anticipated risks may be shared between two parties. Both parties have to set an agreement to share the consequence of risk if that anticipated risk did not response to other mitigation actions. Taylor (2003) suggests to use share ratios in cost-plus or fixed-price incentive contracts are common way to share the negative impacts of risk. El-Sayiegh (2008) in his study paper that covers the risks in the construction industry in the UAE. His study shows clearly that inflation and sudden changes in prices is the highest risk in the UAE construction projects. He also found that fifty five percent (55%) of the respondents indicated that this risk should be shared with between stakeholders. However, he found that owners in the UAE are reluctant to share this risk with contractors. Wang, Dulaimi and Aguria (2004) recommend some techniques to share the risk of inflation with other parties. One of these techniques is to sell foreign firm's shares to local public and local government to get them sharing the financial risk in case the cost got escalated. They also recommend that the parties, if they agreed to share the risk, should be a reputable owner or international institute, to ascertain their risk sharing.

2.6.3.5 Enhance Method

The next method to respond to risk is to try to enhance the anticipated risk, which is inflation, in a way the risk itself can deliver profits or benefits. Taylor (2003) defines enhancing the risk as a method that can be accomplished by strengthening the chances that risk deliver positive benefits and then magnify the return-on-investment. One technique mentioned by Wang, Dulaimi and Aguria (2004) and Woods (2009) is to invest in projects that the price of their product increases if the inflation hits the economy. Some examples of these projects are metal mining projects and oil and gas development projects. Another example of enhancing the risk is found in oil and gas industry/ Some toxic gases and materials, which comes along with the production, are converted to useful product that can be sold in the market for a high prices.

2.6.3.6 Accept Method

The last method of responding to risk is called Accept Risk plan. Accept means to live with the risk as matter of fact. Taylor (2003) says accept the risk is doing nothing. He adds, in some projects some risks cannot be avoided, mitigated, transferred, or shared. These kinds of projects, risk impacts must be accepted as a matter of fact. Earthquakes and tsunamis are some of this kind of risks. In their talk about accepting some risk in a project, Wang (2010) and Gtassman (2006) believe that the market doesn't listen to the daily reports generated by economical expert about the economy and inflation. Therefore, hedging is quiet a challenging task. Mior (1976) writes about the advantages of ignoring inflation. Mior says that it would be better to concentrate attention on the basic cost of funding which is relatively constant rather than concentrating on rate of inflation. Also, inflation is not an easy risk to tackle to save you effort and money as well . Last but not least, ignoring inflation helps in avoiding possibility of double-counting inflation which may already be implicitly present in the cost of capital.

2.6.4 Monitor And Control Stage

The third stage of used risk management strategy is called monitor and control plan. After the risk management got planned and the response plan implemented, there should be a stage where the strategy implementation is monitored and new consequences or even hazards are identified. Taylor (2003) says risk management is not a one-time-only effort and other risks may rise as projects progress. New risks that surface at various points in the project must be continuously monitored and then be subjected to the same risk management process. Project managers have to take adequate measures to implement the response plan. As per Delvalle's (2008) study, inflation is an international threat. Strong demand on food and energy and other goods still exists as a result of the continuous grow of emerging economics such as China. Therefore, inflation in prices can happen in the coming years and managers need to keep an eye on this threat.

2.7 Summary

As it has been presented earlier, Taylor (2003) risk strategy will be used in the research since its closer to the one used in oil and gas industry. All the previous literatures related to each stages (Planning, Response and Monitoring) or methods (Planning, Avoid, Transfer, Enhance, Accept, Ignore and Monitor) of the risk management strategy are summarized in Table 8. The table also contains the interviewees recommended hedges. Therefore, the literatures and the interviewees' recommendations are all in one table.

Chapter Three

3. Research Methodology:

3.1 Introduction

Both qualitative and quantitative methods in collecting and analyzing the data are useful when used in the proper way. The type of the data collected and the time frame given for the research are some factors that the researcher needs to consider determining which method is best for the research. Table 1 shows the major differences between the qualitative and quantitative research methods. It is worth mentioning that Wikipedia (2009) and Wikipedia (2010) have has been used to develop Table 1.

No.	Qualitative	Quantitative
1	The objective is to describe the data in details.	The objective is to classify features, count them, and construct statistical models in trying to explain what is seen.
2	It is rough to the researcher knows what he/she is looking for.	It is clear in advance to the researcher to know what he/she is looking for.
3	Best for earlier phases of the study	Best for latter phases of the study.
4	The data gathering tool is the research.	The data gatheing tool is questionnaires or equipment to collect numerical data.
5	The collected data is in the form of words, pictures or objects.	The collected data is in the form of numbers and statistics.
6	Rich Data & time consuming	More efficient and able to be test hypotheses.
7	Researcher tends to become subjectively immersed in the subject matter.	Researcher tends to remain objectively separated from the subject matter.

Table 1: Differences between qualitative and quantitative research methods.

The research aim is to find out the most reliable hedging techniques that are commonly used by project managers. Inflation effects, as a reason for cost escalation in projects, is a complex economical topic. Based on this, it was found that an ideal questionnaire will not be efficient in collecting the data from respondents since the research is exploring what hedges are there in the market . Therefore, it was found that the interview with more deep discussion with the interviewees will be more helpful to the research. The research

aims to interview many project managers who are working in the UAE to find out which techniques they follow, if any, in their projects to bypass inflation risk.

3.2 Qualitative Research

It has been decided to select the qualitative research approach for this research by carrying out interviews with many project managers with vast experience in project management and the UAE working environment as well. Most of the researchers mentioned inflation as one of the most powerful risk in developing countries however, no research was found discussing preventing projects from inflation effect on project cost. However, a quantitative survey will be conducted to confirm the interview results.

3.3 Nature And Setting Of Study

This research is correlated in nature as the research attempts to find effective and practical protections allows the project managers avoid or mitigate the risk of inflation on the project cost. The research is conducted under natural settings and confined to willing interviewees without external interferences.

3.4 Research Approach

The data collection method in this research is the interview. The aim was to interview some project managers working in the UAE to get their feedback on the pre-prepared questions. Interview is selected as data collection method because inflation is a complex subject and discussion is required with each interviewee to dive deeper to the research topic. On the other hand, interview is hard to do professionally. The interviewer has to prepare the questions very well and choose the type of the questions to get more details from the interviewee. Interviews are not standardized, so it is possible to explain any points in the questions that interviewee might misinterpret to avoid wrong answers.

Moreover, the interviewer has to get appointments from interviewees which is the hardest part of the interview process. Also, interview normally takes time with and more efforts once compared to other type of research methods. In this study, the interviewees were clearly informed about the study objectives and its purpose. The approach is summarized in the diagram shown in Figure 11.

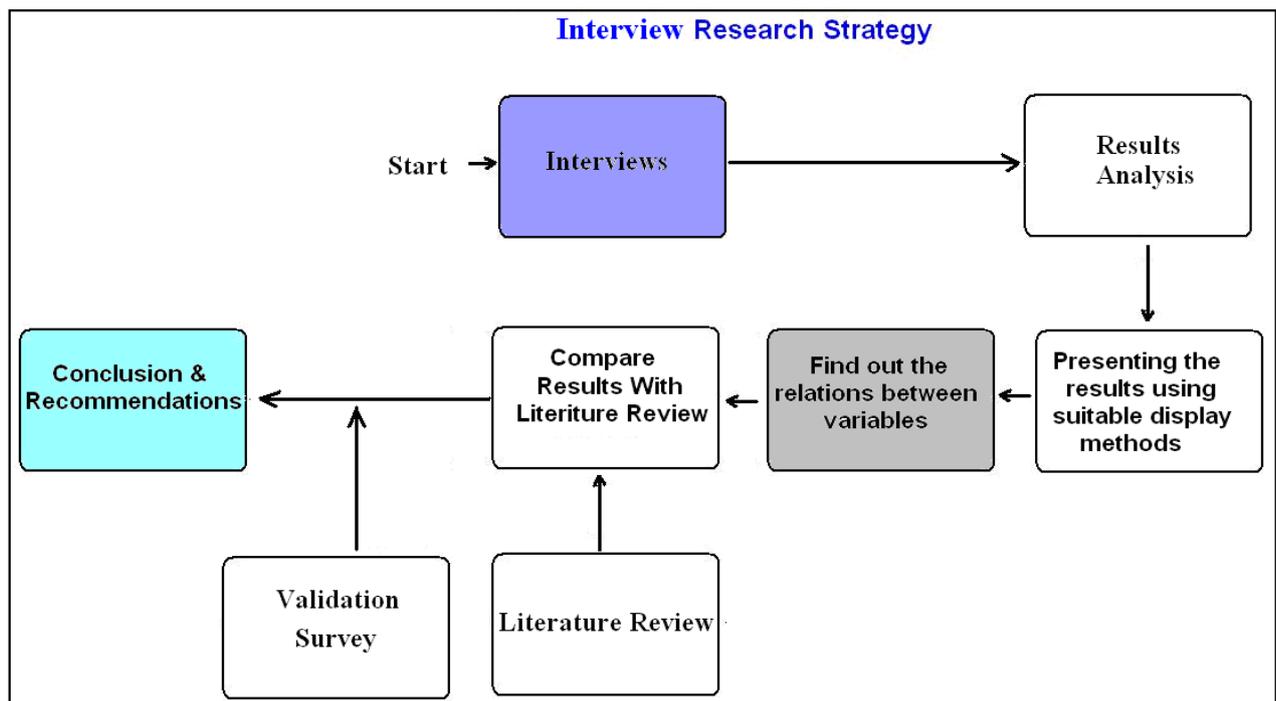


Figure 11: Research Approach Diagram.

3.5 Data Collection Method

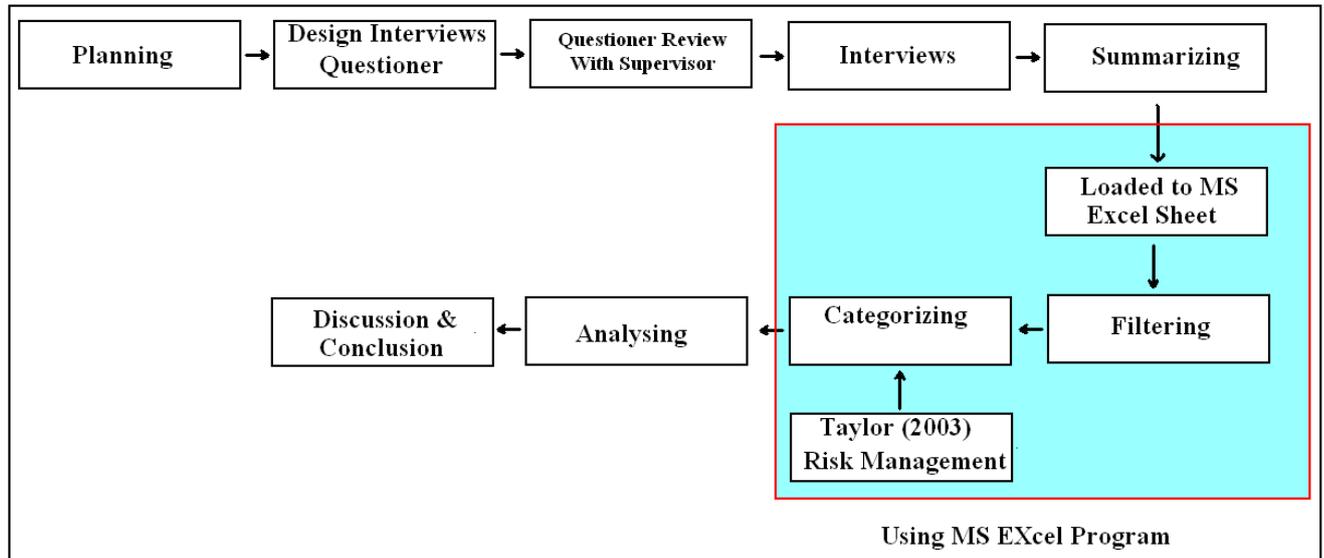


Figure 12: Interview, as a data collection method, is been used in the research. The diagram is showing the stages that the interviews went through.

To examine these issues, interviews with some project managers were conducted in July 2010. The interviews were designed to gather data to helping understanding the real practices of project managers to hedge against inflation. The project managers chosen for this interviews were selected based on their experience in project management in general and project management process in the UAE in particular.

The interviews were carried out between the 1st of July 2010 and 15 of July 2010. All the interviews were transcribed to become as a reference whenever there is a doubt and to retain the data. The interviews adopted a semi-structured approach to ensure that the conversation will be flexible and will move toward the interview objectives. The interview questions were designed based on the literature review and based on my personal experience in project management. Thereafter, the list of questions was sent to interviewees a couple of days prior to the interview time. The interviewees were granted

the confidentiality and the anonymity if they wish. Appendix B shows the process of the data collection method.

Polit and Hungler (1991) states that interviews is a method of data collection. This required the interviewer to ask questions of a respondent. The interview can be conducted either face to face or by phone. In addition, interviews are used to collect information in depth and if insight is required. ONS (2005) and May (2001) believes that interviews can collect more data and insight into people's biographies, opinions and experience. For the benefit of the research, the interviewees have to have the required experience of the research topic. Jick (1979) argues that to gain depth information, we should look for individuals who fit the bill. Hence, since the purpose of this research is to find out the actual practices and insights in today's project management world, thus the interview method is imperative to this study.

Furthermore, Lilleker (2003) argues to base the questionnaire on multiple participants to gather the entire theme. However, some times it become very important to find the right source and ask hem/her to define their opinions. As a conclusion, the more people interviewed, the more reliable background for the discussion chapter.

3.6 Characteristics Of Respondents

This section describes the characteristics of the interviewed experts who helped in finding out the actual practices of the working environment. The mentioned characteristics of the interviewees include their personal professional experience, size of the firm they are associated with, and the types of projects they involved with which are worth billions of dollars. The interviewees, six project mangers or economists, were selected carefully to assure they have the required experience and knowledge to add to the research. It was

assured they participated in projects of different types and sizes. It was not a condition for the interviewees to have an intensive experience in working in the UAE since the research is not aimed at developing a risk management strategy especially for the UAE. It was found that it was hard to find a project manager to be interviewed because each interview required proper planning and scheduling.

3.7 Interview Design

3.7.1 Designing Interview Research

It was realized that the interview as a data collection method is the preferred tool that complies with the research requirements. The objective of the interviews was to collect information from the real business world to how inflation affects project progress and project cost. Also, the interviews aim to understand how project managers deal with inflation and which kind of protection they normally follow. The research also tries to figure out any suggestions from the interviewees to be a kind of future hedge from inflation.

This stage is important to view the path forward while commencing the interviews. It is an essential requirement to carry out the interviews directly after each other with the shortest time between them. The object of such plan is to stay focused and use the information collected from one interview to enhance the output from the next one.

3.7.2 Preparing Questions And Research Supervisor's Review

Based on the literature review done earlier and on the personal experience of the researcher, a list of 20 questions was developed. Then, only 7 questions were selected to be the ones that will be used in the interview. The big reduction of the number of questions from 20 to 7 is because that the interviewees are very senior in their organizations and their time does not allow for a longer interviews. Also, fewer questions

will be used to avoid the duplication of questions and give the interviewees the flexibility and comfort during the interview. Out of these 7 questions, only 2 questions were close ended questionnaire and the other five were open ended questions. Description and purpose of each will be shown in the next section. The questioner has been reviewed and discussed with the supervisor.

3.7.3 Selecting Respondents

As mentioned before, the targeted population is project managers or managers who have been working with mega projects in the region. They were been selected based on their profile, working experience and their administrative positions. Therefore, interviewees are more compliant to the research study. This particular trait of the selected professionals advocates the fact that they are aware of the research problem.

3.7.4 Conducting The Interviews

In this step, the interviews took place. Before the meeting time, the list of questions were sent to the interviewees to get them prepared. The interviews were carried out in the offices of the interviewees. Some of the interviewees requested that the interview not be recorded. However, taking notes were allowed.

3.7.5 Data Processing

The collected data was summarized and organized. Then, the interview data was compared with what was found from the literature review. The findings of the interviews are categorized based on risk strategy methods mentioned by Taylor (2003).

3.8 Description Of Interview Questions

The below questions were posed at the interviews. After each question, there will be a description of the question and the objective behind it.

1- Can you please give me a brief introduction on your self? Can you send me your profile?

This question is to introduce the interviewee and have an idea about his/her profile.

2- Would you mind to mention your name and position in the research?

Since some of the interviewees did not like their names to be mentioned, it would be courteous to ask for their permit to use their names.

3- Do you think price inflation is a real risk to projects especially in the developing countries? Why?

This question is to make sure the interviewee understand that inflation is a kind of risk to projects. In the next step, understand why inflations represent a possible risk to them?

4- In your opinion, what are reasons for price inflation in the region?

This question tries to find out the interviewees perception on reasons caused the price inflation.

5- Have you ever experienced having the project budget overrun because of inflation?

What were these projects?

This questions is to discover if the interviewees themselves faced the problem of cost escalation because of the inflation or not. If yes, which kind of projects they were?

6- Can this problem be avoided or mitigated? In your opinion and based on your experience, how can such problem be avoided or mitigated?

This questions is to find out what the interviewees thought would be an effective protection from inflation.

7- How do you see risk of inflation in the next 10 years?

The aim of this question is to forecast if the problem of inflation will continue in coming years or not. Then, more research can be done on the same problem.

3.9 Advantages & Disadvantages Of Interview

Interviews are great research tool that is been used widely especially in complex areas such economical or technical topics. It helps the researcher to get comprehensive and in-depth answers to explain issues better. Also, it helps the interviewer to explain the aim and objectives of the research and the interview. It should be admitted that face to face talks develop a personal relationship which will help in later research. Additionally, interviews have the ability to restructure the questions, modify the list of questions or even add more questions during the interview.

On the other hand, interviews have some limitations. It is very difficult to adhere to the planned interview time especially if the interviewee is senior. Moreover, the results from the interviews are difficult to analyze and compare since different people have different perceptions and understanding. One of the main weaknesses in interviews as a research method is that the interviewer may misunderstand the interviewee responses. Finally, the interview takes lot of time and great effort and this limits the number of people who be interviewed.

3.10 Research Limitations

Inflation as a topic is a very wide subject and there are a lot of arguments found on it. Different people from different backgrounds have different definitions to this phenomena, which make understanding the subject a tough task. In addition, some difficulties were found while searching for appropriate articles matching the objective of the research. There were many articles about causes of inflation and anticipated calculations but not about hedging projects.

Another limitations found in the research is the difficulty in approaching expert project managers with international experience who are considered as the best people to talk with concerning the research subject. In addition, arranging a meeting that suits the interviewee and the interviewer was challenging.

Since I was a project engineer in Dubai Petroleum Establishment during the research period, my daily schedule is full. It is very hard to find some time working on the dissertation. Then, I have to cut few hours from my family and personal time to meet the research deadline. Moreover, there was no financial allocated by the university to support the research. Lack of financial support limits the research findings.

Another matter to mention is that while doing the Validation survey to confirm the research findings, it was very difficult to find the right surveyees to participate in the survey. Therefore, the survey was sent to my personal contacts. Also, BUiD had been asked to support the Validation survey by sending the survey to the students of Project Management Program used at BUiD. Barely, 26 surveyees participated.

Chapter Four

4. Data Analysis And Results

4.1 Introduction

The interviews were with six project managers and economists who have a project management background. The interviewees have long experience with many well know companies such as Royal Bank of Scotland, JPMorgan, Sell, ExxonMobile, BP, Dubai Petroleum, McDermott, Kliegs Brown and Routes, John Brown, ZADCO, Kverner Oil and Gas and Takneeb. Their extensive experience supports their point of view on the topic. The total accumulated experience of all interviewees is more than 110 years. The companies that have been mentioned before vary from financial institute, oil and gas companies, project management consultant and engineering companies. Additionally, some of the experience of the interviewees is inside the UAE but most of it is external. To make the interview findings more useful, the collected data was filtered, categorized based on hedge method mentioned by Taylor (2003). A further step was to classify the hedges into four different levels. The levels are level four, level three, and level two and level one. For instance, whenever four interviewees (or more) recommend a cretin method as a hedge against inflation, it is been considered as a Level Four hedge. The same process is done for the other three levels. See Appendix B to check out the process on processing the data collected by the interviews.

To visualize which hedging methods is the most effective and reliable method, another step is done next to give a score to each hedging methods. The method score depends on the number of hedges belongs to that method and to which level these hedges were classified. The findings were represented in the form of charts and tables to facilitate the findings discussion in the next section. See Appendix B for more information.

4.2 Introduction To Interviewees:

4.2.1 Carl Toker

Carl Toker, Head of Cost Control and Estimation, has 35 years plus experience. Carl started his life as a Field Engineer / Project Engineer with Redpath Engineering Construction & fabrication of Offshore Platform sub assemblies. He spent 10 Years in this role. Then, Carl spent 5 years as an Estimator for Offshore / Onshore module assemblies with Davy Offshore Modules. After that, Carl spent 2 years as Senior Estimator for London design house McDermott's International working on offshore projects worldwide. Next, Carl spent 20 years as a Lead Estimator / Principal Estimator / Risk Analyst for International Contractor Kellogg Brown & Root working on Offshore Brownfield & Greenfield projects worldwide. Currently, Carl works as Head of Estimating & Cost Control for Dubai Petroleum working on offshore projects.

4.2.2 Tony Galustian

Tony has spent 3 years in each of the following positions: Project Engineer in Takneeb Abu Dhabi, Project Engineer in Kverner Oil & Gas, Sr.Pipe Engineer in Kellogg Brown & Routs, Sr.Pipe Engineer in Zadco Abu Dhabi, Sr.Project Engineer Dubai Petroleum Company, Sr. Project Engineer McDermott Dubai. Tony is currently working as Project Manager in Dubai Petroleum Establishment.

4.2.3 Eugene Flynn

Eugene had started his carrier as Lead Mechanical Engineer - ExxonMobil Buckland & Skene Project. He spent 5 years in that position. Then, he spent 2 years as Project Manager - BP Chirag 1 PREP 2 Project. Next, he spent 1 year as Project Engineer - Marathon Solstice Project. After that, he became a Project Manager in Shell Toucan

Field development and Rabi field Gas Compression upgrade project. Following that, Eugene became 1 year as Project Management Consultant – Sakhalin II Phase 2 (SEIC) Cost Recovery Project. Then, he became a Senior Project Manager – Sakhalin II Phase 2 (SEIC) Central Engineering Team. He spent 2.5 years in this position. Finally, he is currently working as Project Manager with Brown Fields Company, which provides its services to Dubai Petroleum.

4.2.4 Alan Desira

Alan works as an advisor to Royal Bank of Scotland (RBS) who studies the stock market and exchange rate changes and inflation and consequences based on them. Alan is Head of Corporate Risk Solutions (CRS) in Middle East and North Africa at the Royal Bank of Scotland (RBS) and a senior member of the RBS MEA Management Team. Through his current role, and previously as the Senior Marketer in the UK team, Alan has been responsible for advising and executing risk management solutions for some of the largest global companies, with particular focus on interest rate derivatives, foreign exchange and credit derivative management. Prior to joining RBS in 2007, Alan spent over 10 years at JPMorgan in a variety of risk management and financial market sales roles in their London, New York and European offices.

Alan graduated with a BA (Hons) in Industrial Economics at University of Nottingham and is registered with the FSA.

4.2.5 Brian Hall

Brian worked with Shell as an economist for 7 years. Then, he joined Dubai Petroleum as Economics Assistant.

4.2.6 Lei Zhang

Lei Zhang is an experienced professional specializing on business planning, deal evaluation, project economics, and business development in oil and gas industry. He previously worked in Shell China as an M&A Project Manager, Economics Team Lead for 5 years. Prior to that, he was a Business Development Manager in P&G. Last year he joined Dubai Petroleum Establishment as Economist in Business Planning Department.

Brian as worked with Shell as Economist for 7 years. Then, he joined Dubai Petroleum as Economics Assistant.

4.3 Data Analysis

The data collected during the interviews were recorded on papers to make the task fast and efficient. Then, the interviews' data was loaded to an MS Excel sheet to filter and summarize the findings of the interviews. Afterward, the process of categorizing the data was started. It is worth mentioning that the process of categorizing the interview data was a lengthy process. Categorization was done through two steps. The first step is categorization based on hedge type. Then, each hedge was categorized based on Taylor's (2003) risk management strategy. First, all topics were discussed with the interviewees considered as a category. Next, the categories grouped in a way that matches the literature review structure. This means, the categories belonging to the planning was grouped together and the categories which talks about the response phase have been grouped as one. In the other words, for example, interviews' recommendations on fixed price contract have been grouped together. Then, this group is classified as a risk transfer method. The same step was done for other hedges.

The benefit of the previously mentioned method is organizing the data collected from the interviews in a way that helps the research understand the relations between the

interviewees' opinions. Therefore, a better understanding of their opinions can be achieved. The interview data in the categorized format is shown in APPENDIX A.

4.4 Results And Findings

An additional step was done to figure out the hedges that been considered by most of the interviewees or on other words, the reliability of the hedge. In other words, the following step was done to find out the criticality of all topics recommended by the interviewees. In this regard, Level Four hedge has been discussed and recommended by 4 out of 5 interviewees. Level Three hedge is the hedge that has been discussed and recommended by 3 out of 5 interviewees. Level Two hedge is the hedge that has been discussed and recommended by 2 out of 5 interviewees. Level One hedge is the hedge that has been discussed and recommended by 1 out of 5 interviewees. Afterwards, Level four hedges are the most reliable hedges as per the interviewees' feedback and Level one is the least reliable hedges. It is found that 4 hedges are considered as Level Four, 3 hedges as Level Three, 6 hedges as Level Two and 10 hedges as Level One

4.4.1 Level Four Hedges

Based on the interviews data, 4 hedges were found as Level Four. These hedges were discussed and recommended by 4 (or more) out of 6 interviewees. The Level Four hedges are proper planning, understanding the project variables, including inflation in the cost estimation and fixed price contract. The summary of Level Four hedges is shown in Table 2.

No.	Hedge Type	Description
1	Proper Planning	Planning the project very well in the initial stage can be a hedge from inflation. The proper planning may include considering the project duration, hiring an economist to do the economical evaluation of the project, determine the right type of funding to avoid inflation consequences, seek other cheaper alternatives to staff / materials, follow restricted Quality Assurance Quality Conformance (QAQC) and splitting the project into smaller pieces of work.
2	Understanding Project's Variables	The more the project manager understands the project variables, the better his/her ability to choose the right hedge against inflation. Part of hedging is understanding the variables that you want to hedge against.
3	Cost Estimation	Project cost estimation needs to consider the risk of budget escalation that may happen because of inflation.
4	Fixed Priced Contract	Transferring the risk of cost variation to the contractor can be done by the fixed price contract.

Table 2: Summary of Level Four hedges as per interviewees' feedback

Proper Planning (Planning) is recommended by Toker, Flynn, Galustian and Desira. They all agree that the longer the project duration, the harder to control the inflation. At the planning phase, the project manager needs to shorten the project duration as much as practically possible. Flynn recommends hiring an economist in the planning phase of the project in some cases when the project size is large. Flynn says that the project fund type

determines the proper kind of hedge to the project. Flynn adds that good cash flow management appropriate to the funding type will help in controlling the inflation impact.

On the same topic, Galustian says that once the project engineer realized that the cost of the project is overrun because of inflation, the right thing for him to do is to **cut some of the cost** of the project. That can be done by many means and should be predetermined in the planning phase. He adds, the project manager needs to seek other cheaper alternatives for staff / material alternatives. This works better if the project schedule is not tight. Galustian concluded his statement by saying that Quality Assurance and Quality Convergence (QAQC) (Planning) is also a respectful option to offset inflation risk. Good QAQC practice helps the project in finding the exact quantity of the materials which means less cost.

Desira says that the selection of the hedge needs to consider the **project liquidity**. Some hedges are available in a small amount in the market. Thus, for big projects, it maybe difficult to buy the hedges from the market since there will be less hedge contract available.

Tuker says that **splitting the project** into smaller pieces of work will minimize the risk of depending on contractor. If inflation hit a piece of work, then the consequence will be limited to that work only. Bigger companies can do the bigger projects only. Later, and since there is few big companies in the market, then competition is very limited. The client will tend to depend on a single contractor. Therefore splitting the work into smaller piece will allow other companies to participate in the work.

Desira adds that **project funding** methods are different. The project fund can be by cash from stakeholders or shareholders, or from a bank as a loan or a loan from a third party. Each method of funding requires the project manager to deal with inflation risks in different ways. For example, if the project got funded through a bank, then definitely there will be an interest on the loan. These interests are varying up and down from time to time based on the economy status. The central banks use the interest rate as a means to control the inflation in the country by managing the money supply into the economy. Then, as a result, interest rate changes from time to time based on the economy situation. Therefore, if the project manager can manage the interest rate changes, then he can manage the inflation to some extent

Understanding Project's Variables (Planning) is considered by most of the interviewees as the first right step to protect the project from inflation. Tucker, Galustian, Desira, Hall and Lei have considered this hedge as a critical protection layer. Desira believes that the golden rule is "each project has different variables with different characteristics. The project manager's job is to address these variables, understand them and then chose the most appropriate ones". Hall and Lei support Desira's argument. Hall and Lei say that there is no secret & unique formula to avoid your project from inflation since every project has its own characteristics and variables. Tucker agrees with Hall, lei and Desira. Tucker says that the project variables need to be studied very well at the initial stages to decide which the hedge works well for the project. World wide inflation needs to be considered as well. These variables vary with the project nature, project financing method, stakeholders' objectives and expectations or with the country the project in. The right hedge can be selected after these variables have been addressed in the first place.

The Third hedge in Level Four is using anticipated inflation rate into **Cost Estimation (Planning)**. Tucker, Galustian, Flynn, Brian and Lei agree on this as a strategy to avoid inflation risk is happened. It is emphasized by Tucker that this strategy is the most common way to deal with inflation. Galustian supports Tucker's opinion, however, he suggests considering accurate numbers that represent the future inflation rate. Hall, Lei and Flynn suggest that inflation rate to be included in the calculations of the cost estimation is between 5% to 10%.

The fourth Level Four hedge is the **Fixed Price Contract (Transfer)**. Galustian, Desira, Tucker, Hall and Lei agree that fixed price contract is a great tool to avoid inflation risk by transferring it to a contractor. Desira recommends fixed price contract on condition that the anticipated future inflation rate will be higher and probably unpredictable. If the anticipated inflation rate is going to be stable or declining, then fixed price contract is not a good hedge for inflation. Tucker sees the subject from a different angle. He says that the project will be affected by inflation anyway if the fixed price contract is selected. The bidding contracts will include a higher inflation rate in their cost estimation. Then, at the end, the project will pay for the inflation in an indirect way. Tickers also says that if inflation hits the project, the contractor with the fixed price contact will start losing money to the advantage of the project. On the other hand, money lost by the contractor means the contractor will start trying aggressively to change the scope of work and reduce the project quality to save some money to cover his losses. Failure of the contractor because of the fixed price contract will definitely lead to failure of the project in some ways.

4.4.2 Level Three Hedges

Based on the interviews data, 3 Level Three hedges were found. These hedges were discussed by 3 out of 6 interviewees. The hedges are Long term contract, Insurance and Commodities. The summary of Level Three is shown in Table 3 below.

No.	Hedge Type	Description
1	Long Term Contract	Having long term contract or agreement with the vendors or subcontractor with a pre-defined price.
2	Insurance	Insurance as a tool to transfer the risk of inflation to a third party. Insuring the project from the risk of project failure that can happen because of wrong cost estimation or because of technical mistakes or because of any reason that can postponed the project progress.
3	Commodities	Investing the project fund in commodities to offset the price increase because of inflation and maintaining purchasing power while considering the needed cash flow for the project.

Table 3: Summary of Level Three hedges as per the data collected from the interviews

Long Term Contract (Transfer) is the first hedge to be discussed. Tucker, Flynn and Brine have agreed that the Long Term Contract is a good strategy to avoid cost escalation caused by inflation. The contract has to have predetermined prices of the material or services that will be provided by the contractor. Tucker says that such contracts will secure some work to the contractor and give the client an acceptable increase in materials or service charges. Flynn also believes that the long term contract with the contract works fine as a hedge to the client especially after some years of signing the contract. The longer the contract, the more advantage to client will be gained.

Insurance (Transfer) is another Level Three hedge. Tucker, Flynn and Galustian agree on the usefulness of insurance. Tucker says that paying a premium of 2% to an insurance company to cover any risk is not always a good decision especially for oil and gas project. Therefore, some big companies such as British Petroleum (BP) have their own internal insurance system to cover many kind or risks such as inflation. Flynn thinks that there is an insurance which can be used to make sure the price of a certain collection of materials or machineries will not exceed a certain limit. Galustian says he has not heard of direct inflation insurance. However, he has seen some insurance against technical areas including cost estimation.

Desira, Tucker and Flynn say that investing in **Commodities (Reduce)** may work against the negative impact of inflation on cost. Desira, as a finance specialist, recommends buying commodities with Call or Put options from the international markets whenever the project manager needs the commodities prices within a certain limit. Call options is an option that gives the trader (Project manager) an option to buy a commodity at a certain price within a predetermined period of time. The Put option is an option gives the trader a facility to sell the commodity at a certain price within a predetermined period of time. Tucker believes that buying commodities upfront is a good option if the project's scope of work is finalized and mostly will not be changed. However, material price forecast needs to be done periodically to ensure possible price increase.

4.4.3 Level Two Hedges

Based on the interview data, 5 Level Two hedges were found. These hedges were discussed by 2 out of 6 interviewees. These hedges are considering country regulations, coordinate with other competitors, Consult with Specialized institute, resource management and post cost reduction, invest in Bonds and Track Inflation Rate Changes during the project life time. The summary of Level Two hedges is shown in Table 4.

No.	Hedge Type	Description
1	Considering Country Regulations	Understanding the spatiality of country regulation and economical direction helps the project manager to respond better.
2	Coordinate With Other Competitors	Competitors cooperate and coordinate with each other through some associations to avoid over demand on materials, labor and machinery
3	Consult With Specialized Institute	Some specialized consultancies provide their anticipation for the inflation rate in the coming years or even quarter. This can make the cost estimation more accurate.
4	Resource Management And Post Cost Reduction	Managing the used resources in the project reduces the need for additional materials or labor which means less cost. In case inflation hits the project, the project manger can reduce inflation impact on the project cost via restricted resources management.
5	Us Bonds	Investing the project fund in US Bonds and use the annual return to offset the price increase.
6	Track Inflation Rate Changes	Keeping an eye on inflation rate even during the project life time helps the manger responding well to the risk.

Table 4: : Summary of Level Tow hedges as per the data collected from Interviews' feedback.

Desira and Flynn agree that ***considering country regulations (Planning)*** and specialty help protect the project from cost escalation. Desira gives Saudi Arabia as an example of countries where some hedges can not be used. Desira says that some financial

derivatives, which can be considered as inflation hedges such as investing in USA Bonds is not consistent with Saudi Arabia since the Islamic religion is dominating over there.

Coordinating With Competitors (Share) is another hedge suggested by Toker and Flynn. Toker says that some associations in UK coordinate between the contractors to avoid over demand on materials, labor and machineries. This step helps the contractor to do a good marginal profit but in limited basis. Flynn recommends that, for large projects, Joint Venture agreement between contractor can be useful to reduce the cost of the labor and materials. Flynn says that inflation also increases the value of the project itself. Then, at high inflation times, a percentage of the project can be sold to another party to overcome inflation impact and make the new party share the risk as well.

Special Inflation Consultancy (Planning/Monitor) is another method to reduce the impact of inflation. Toker, Desira and Flynn agree on the benefit of this method. For example, Toker uses the forecast done by an association called IHS which is a source of critical information and insight into future economical expectations. IHS provides an expectation for Capital Project Cost on quarterly basis. Based on experience, their expectations are great.

Resource Management (Planning/Reduce) and Cost Reduction is another Level Two hedge. Desira thinks it a good idea, however, the project manager need to do the anticipation himself since he understands the project better than the others. Flynn says that third party experience is good to use however it will work only for large projects. Flynn says that some companies issue inflation expectations on annual basis to guide the project manager in cost estimation.

Desira, Hall and Lei state that investing the project budget in **US Bonds (Reduce)** can offset the inflation impact to some limit. Hall and Lei say that for some projects, the cash availability is more important than hedging against inflation.

Track Inflation Rate Changes (Monitor) during the project life time is another good Level Two hedge. Toker and Galustian argue that monitoring the inflation during the project life time is very helpful and can be considered as a major part of the hedging equation. It will warn the project manager from an expected price change that can never be considered in the budget estimation. Also, it can reduce the money allocated for the project as the anticipated inflation is going down.

4.4.4 Level One Hedges

Based on the interview data, 11 Level One hedges were found. These hedges were discussed by 1 out of 6 interviewees. These are project visibility, company strategy in risk taking, cost of managing inflation, final product specialty, and direct dealing with manufacturers, Interest Rate Swap, Credit Default Swap, Interest Rate CAP, exchange rate, partial hedging and ignoring inflation. The summary of Level One hedges is shown in Table 5.

No.	Hedge Type	Description
1	Project Visibility	Making sure from the beginning that the project is visible while considering all risks including the inflation risk.
2	Company Strategy In Risk Taking	The project manager to comply with the company corporate strategy in dealing with risk.
3	Cost of Managing Inflation	Managing inflation has a cost. Sometimes the cost of managing the expected inflation and monitoring the rate of change is much more expensive than the expected impact of the inflation on the project cost.
4	Final Product Specialty	The price of some product, such as commodities increase with the inflation. Afterwards, the increase in the product price will help in offsetting the increase in the cost of the project.
5	Dealing Directly With The Manufacturers	Dealing direct with vendors to have easier project and ability to monitor and control the price increase.
6	Interest Rate Swap	Is a financial derivative to protect the loan from varying interest rate, which changes as a result of inflation.
7	Interest Rate CAP	A financial derivative to make the interest rate on a loan constant or not to exceed a certain limit if inflation increasing unexpectedly.
8	Exchange Rate	Currency exchange rate between countries varies specially at the time of inflation. These variations lead to uncalculated

		price increase.
9	Partial Hedging	Hedging a part of the project , such as insuring the project fund only, can be considered as a type of protection against inflation
10	Ignoring Inflation	Never include the inflation in the cost estimation or in the risk management strategy. Forget about it.

Table 5: Summary of Level One hedges as per the data collected from the interviews' feedback

Hall claims that the ***Company Strategy In Taking The Risk (Planning)*** as an important step in hedging strategy. He says that the manager needs to decide based on the company corporate strategy and the project management strategy to which level the project can be exposed to a risk such as inflation. Normally, at the time of cost estimation, inflation is considered based on historical data. A lot of factors are playing a significant role in affecting the project budget and set the risk exposure limits. Every project manager has to understand the project characteristics details to decide to which level a risk can be taken and what are the most appropriate mitigation that can be taken.

Desira specializes in ***Financial Derivatives (Avoid/Reduce)*** that can be used to hedge against inflation. Desira talks about Interest Rate Swap as an option given to the borrower to make the variable interest rate a fixed interest rate. Therefore, the risk changing interest rate will be avoided. Additionally, an Desira stats that another kind of hedges is called Credit Default swap (CDS), as a hedge, is a kind of insurance that protects the loan from the risk of getting the client bankrupted. For example, if a project has a single client, then, if the client is bankrupted, the project will be affected negatively. Interest Rate CAP is another hedge that has been highlighted by Desira. Desira says that Interest Rate CAP assures that the interest rate on a loan will not go above a certain level.

Eugene mentions that **Currency Exchange Rate (Reduce)** is very critical in avoiding inflation's bad impact on project cost. Flynn experienced in one of the large project done in Russia that the exchange rate changes increase the prices randomly. It was found that from the time the cost estimation was done, the Russian Rubble (Russia Currency) fell by 20%) which led to increase on every thing that is paid by any other currency. The Rubble fell because the country's economy was suffering at that time. Therefore, most of the project requirements from material, equipment or labor became more expensive. One of the techniques is to have a multi-currency budget. This was a recommendation given by the investigation team to avoid the currency exchange rate variation. If one currency increases, the other one will offset it.

Desira says that managing inflation in a project is an additional cost to the project. If the cost of managing inflation is higher compared to the risk of having a fixed price contract and the price goes down, then a fixed price contract is a better choice. Flynn suggested another hedge. He says that one of the techniques that were used to avoid inflation is to contact the manufacturer directly. Fabricator or integrators normally add more cost to the project. As a result, the impact of inflation will take them out of consideration.

Desira and Toker added two different hedges. Desira argues that the project manager can hedge a part of the project if he thinks that this part of the project will be affected by inflation. For example, it was found that, from a research, a variable X is correlated to inflation by 90% of the times, however, variable Y is correlated by 20% to inflation. Next, it is better to the project manager to focus on variable X and hedge against the price change of variable X. On the other hand, Toker says that ignoring the inflation is not a good choice. Sometimes, management ignores the inflation impact on the project to show

the required budget in a lower figure. Thereafter, getting the approval from the senior management.

4.4.5 Findings Summary

To make an easier understanding and how the whole data is related to each other, Table 6 has been built to summarize all the interviews findings. They have been categorized based on the stages mentioned in Taylor's (2003) risk management strategy. Table 6 is useful since it helps the research to figure out to which category that most of the hedges belong to. Table 6 is represented graphically in Figure 12. Figure 13 shows Risk Management Strategy stages based on how many hedges were found in each one of them. Table 7 has been built to rank all hedges in each stage based on the hedge level. Table 7 is represented by Figure 14.

Hedge Type No.	Planning	Avoid	Transfer	Reduce	Share	Enhance	Accept	Monitor
1	Project Planning	Interest Rate CAP	Fixed Priced Contract	Deal With Manufacturer Directly	Coordination With Competitors	Final Product Specialty	Ignore Inflation	Specialized Inflation Consultancy
2	Project Variables		Long Term Contract	US Bond				Inflation Tracking
3	Company Strategy in Risk Management		Insurance	Interest Rate Swap				
4	Country Regulations Specialty			Credit Default Swap (CDS)				
5	Cost of Managing Inflation			Commodities				
6	Project Visibility			Exchange Rate				
7	Cost Estimation			Partial Hedging				
8	Resource Management and Post Cost Reduction							

Table 6: Summary of interview findings. They have been categorized based on Taylor's (2003) risk management strategy..

Hedge Level	Planning	Avoid	Transfer	Reduce	Share	Enhance	Accept	Monitor
Level 4	<ul style="list-style-type: none"> ♦ Proper Planning ♦ Understanding Project's Variables ♦ Cost Estimation 		<ul style="list-style-type: none"> ♦ Fixed Priced Contract 					
Level 3			<ul style="list-style-type: none"> ♦ Long Term Contract ♦ Insurance 	<ul style="list-style-type: none"> ♦ Commodities 				
Level 2	<ul style="list-style-type: none"> ♦ Considering Country Regulations ♦ Consult With Specialized Institute ♦ Resources Management And Post Cost Reduction 				<ul style="list-style-type: none"> ♦ Coordinate with Other Competitors 			
Level 1	<ul style="list-style-type: none"> ♦ Project Visibility ♦ Cost of managing ♦ Inflation 	<ul style="list-style-type: none"> ♦ Interest Rate CAP 		<ul style="list-style-type: none"> ♦ Us Bonds ♦ Deal With Manufacturer Directly ♦ Interest Rate Swap ♦ Credit Default Swap ♦ Exchange Rate ♦ Partial Hedging 		<ul style="list-style-type: none"> ♦ Final Product Specialty 	<ul style="list-style-type: none"> ♦ Ignoring Inflation 	<ul style="list-style-type: none"> ♦ Track Inflation Rate Changes
Total Credit	19	1	10	9	2	1	1	1

Table 7: Summary of interview findings based on level of hedges and risk management strategy stages.

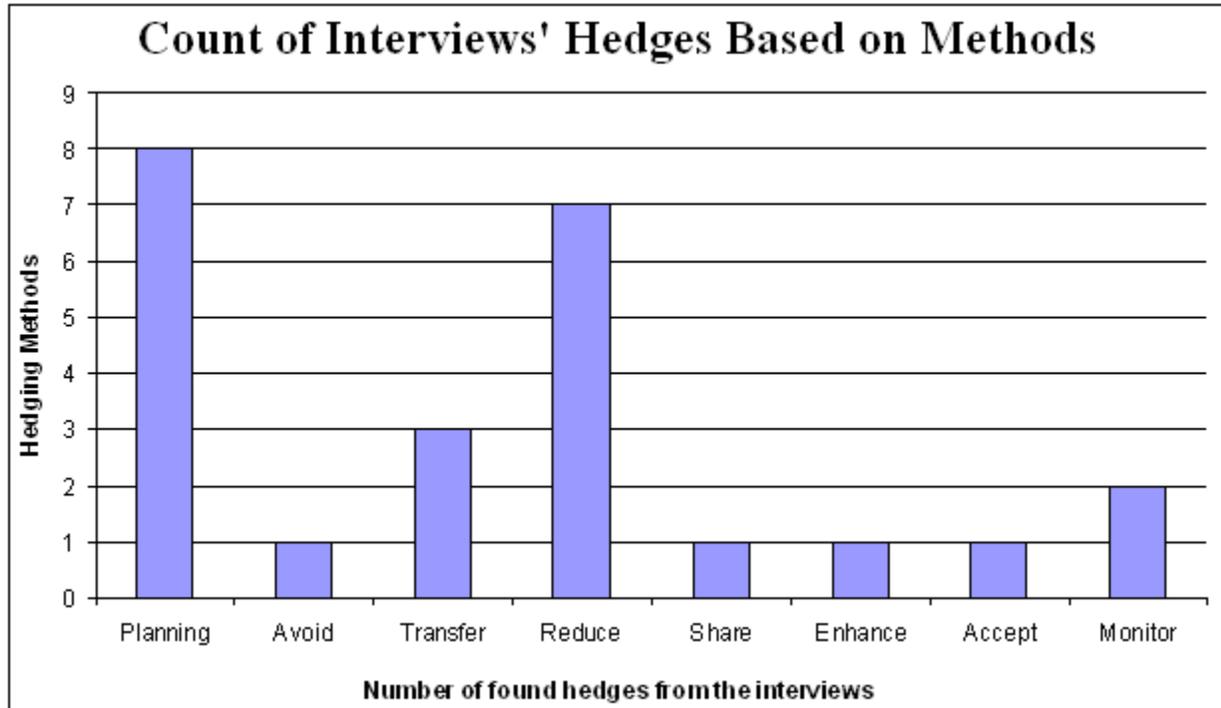


Figure 13: Interview findings represented based on Taylor's (2003) methods. The figure shows the count of the hedges that have been found under each method.

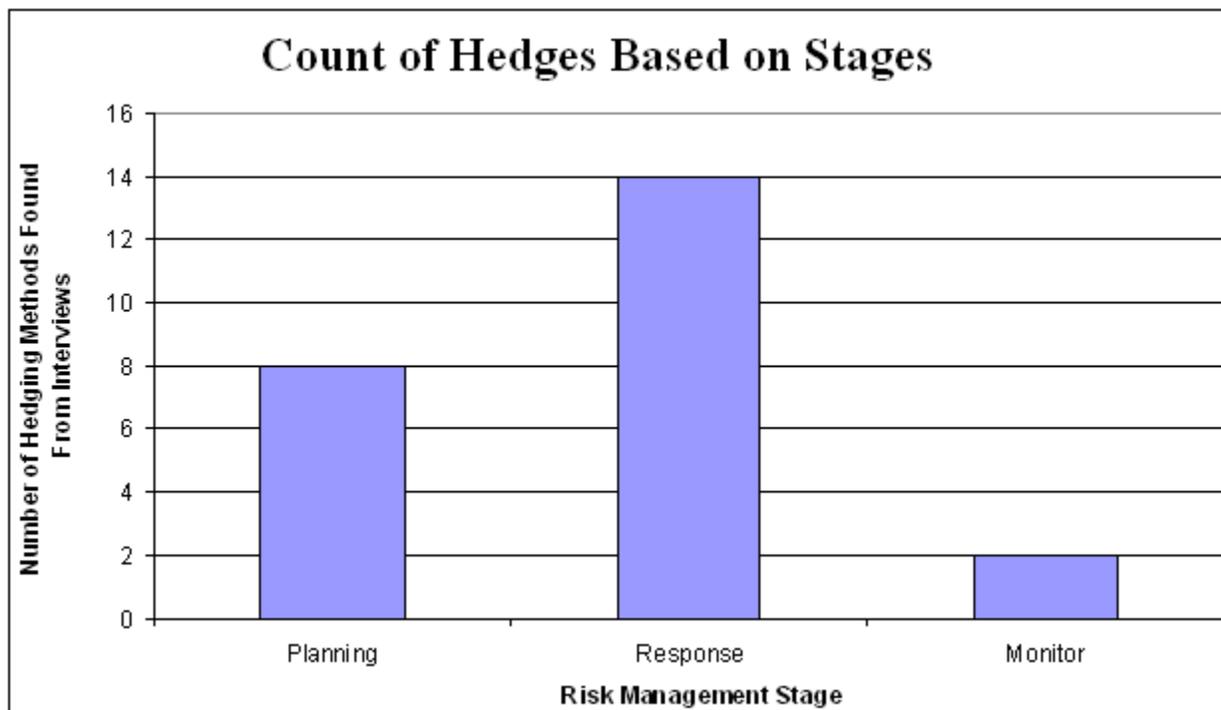


Figure 14: The count of hedges collected from interviews represented based on Taylor's (2003) Stages.

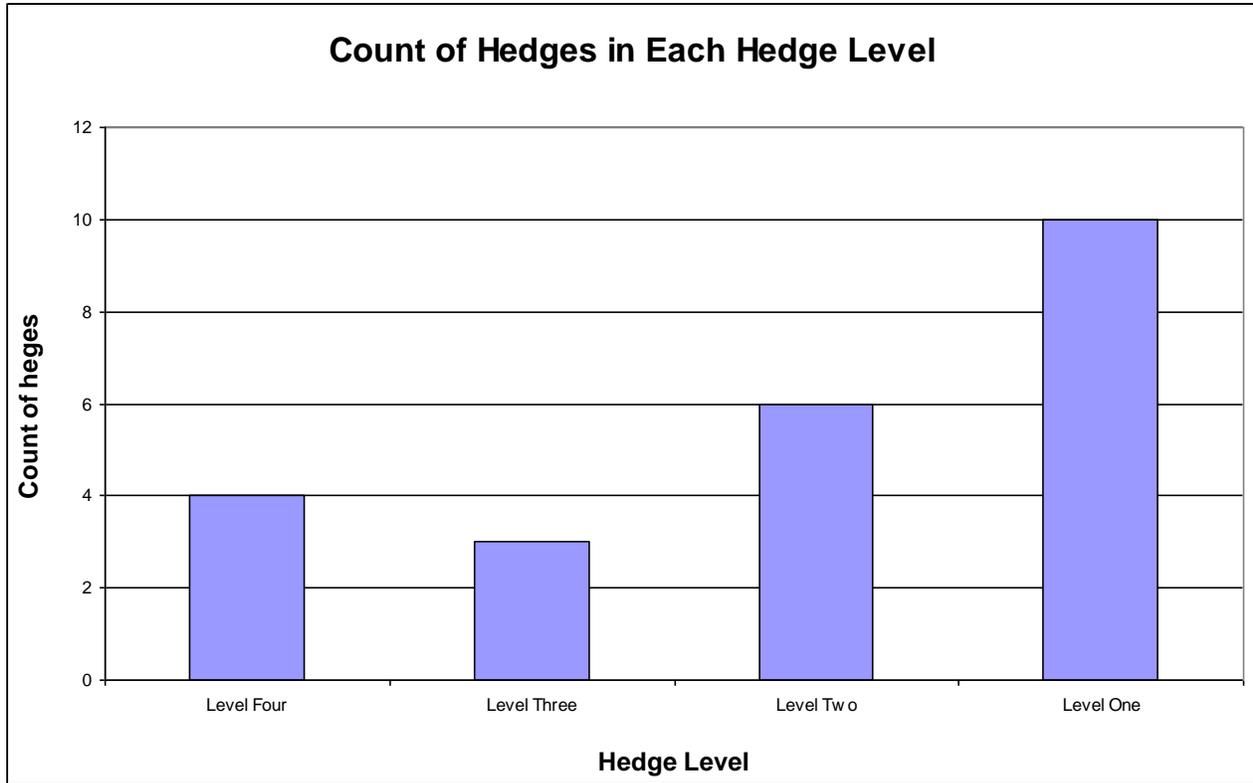


Figure 15: Hedge Levels are represented based on the count of hedges in each level

4.4.5 Scoring Hedging Methods

An additional step was done to Table 7 which was giving a score to each method to find out the reliability of each method. What was meant here is that each hedging method (Planning, Avoid, Transfer, Reduce, Share, Enhance, Accept, Ignore and Monitor) is given a score based on the Level of the hedges that were found in each method. Subsequently, each hedge in Level Four will give the respective method 4 points, each Level Three hedge will give the respective method 3 points, each Level Two hedge will give the respective method 2 points and each Level One hedge will give the respective method 1 point. The addition of all points collected by each method will represent the score of that method. The higher the score the method has, the more reliable it is. The final result is shown in Figure 16. For a better understanding, one example will be illustrated. To conclude, this step is to find out the most reliable methods based on interview recommendations while considering the count of the hedges in each method and the Level of those hedges. The score given for each method is shown in Figure 16.

For instance, in Transfer method, there is one hedge in Level Four and two hedges in Level three. Then the total score can be calculated as follows:

$$\begin{aligned} \text{Score of Transfer Method} &= (\text{Number of Level Four Hedges} \times 4) + (\text{Number of Level Three} \\ &\text{Hedges} \times 3) + (\text{Number of Level Two Hedges} \times 2) + (\text{Number of Level One Hedges} \times 1) \\ &= (1 \times 4) + (2 \times 3) + (0 \times 2) + (0 \times 1) = 10 \text{ (points)} \end{aligned}$$

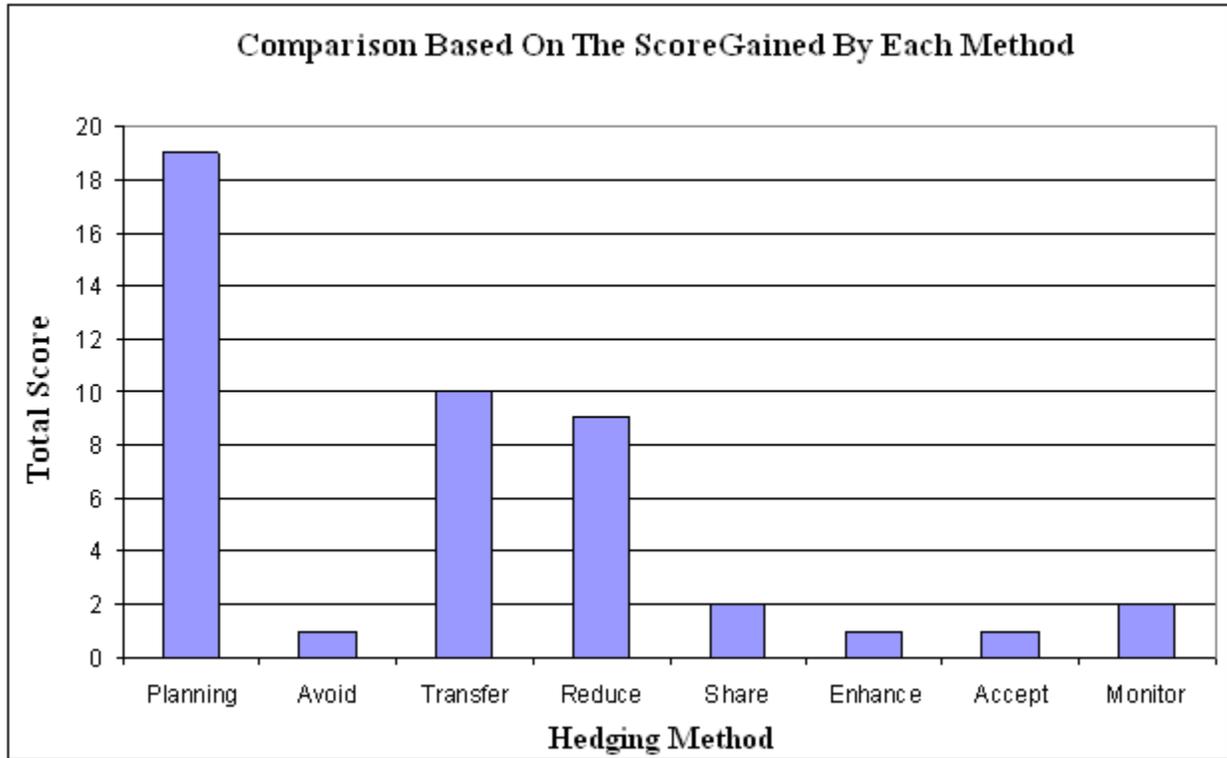


Figure 16: Risk Management Strategy methods represented based on the score collected by each respectively.

Chapter Five

5. Discussion

5.1 Literature Discussion

As per the definition of risk management strategy shown in section 2.2.3, it is one of the ultimate responsibilities of the project manager to facilitate the risk assessment of the project. The specialty of inflation as a kind of risk occurs when it is out of the direct control of the project manager. However, the manager can hedge from the possible negative impacts by avoiding, transferring or reducing the risk impact. D.Choi and G. Choi (2009) claim that approximately 80 % of globally development projects fail while they are in progress and the other completed 20% took more costs and time than expected. The justification for this is that projects failed to recognize the risks and risk degrees in advance and they did not build a proper risk management strategy.

As has been shown in Figure 10, the actual inflation is not matching the anticipated inflation rate most of the time. The difference between both is significant once we look at year 1986 and 2007. The differences were 5% and 3 % respectively. Therefore, depending on inflation forecasting is not a useful tool. However, predicting inflation rate is useful to know the main trend of inflation in the future. The situation in the UAE is even worse.

The UAE suffers from the unavailability of accurate numbers of the actual inflation happened in the country. The research can find different numbers from different resources. For the last 10 years, the UAE never rested from inflation as per EFG (2009). It looks like a serious problem and hedging against inflation is a mandatory step to avoid

the cancellation or bankruptcy of projects. Since the UAE is an importing country in general, the exchange rate is a serious factor that leads to prices increase. The same situation is evident in other countries.

If the inflation remains moderate as it has been for the last three decades in the world in general and the USA in particular, then the risk of the problem of inflation is limited. However, hyperinflation is a very possible situation as per Todd Buchhol (COBank 2008) who says that the hyperinflation is very possible event since the money printing presses are working at full speed. Meaning, this will hit the economic.

Other researchers such as Dickens, Goette, Groshen, Holden, Messina, Schweitzer, Turunen, and Ward (2006) and Braun and Tella (2000) believe that inflation causes uncertainty in future economics, uncertainty in project management, lower economic growth and world welfare. The inflation risk has swept beyond the boundary of economics to reach the social life as per the argument made by Schaefer (1973).

5.2 Data Analysis Discussion

Ellen (2009), Arditi, Akan and Gurdamar (1985) agree with Schaefer that inflation is a real risk and investors have to hedge against it. They say that inflation is one indirect reason to have delays in construction projects. Inflation affects the material prices and labor wages. All the interviewees believe in the negative effect of inflation on projects and they do agree on hedging against as a must. Wang, Dulaimi and Aguria (2004) say that Inflation is an economical problem that is caused by many complex local, international, economical and political reasons, which may explain why the project manager has to hedge from inflation rather than thinking of sorting out the problem of inflation. In other words, the problem control is out of the manager's hand. The only thing that they can do, in general, is hedging.

Hedging is a common sense behavior once the risk is addressed, which explains why so many hedges (23 hedges) were found out of the interviews. Refer to Figure 13. In terms of number of hedges count and which has been shown in Data Analysis section, most of the hedges belong to the response stage. It was found that 13 out of the 23 hedges belong to the response stage. Then, the planning stage comes in the second place. Finally, the monitoring stage comes in the last stage. What can be understood from this is that most of the hedging tools are available to the project manager in the response stage, regardless of their effectiveness. One other argument on the above finding is that project managers usually try to response to the problem of inflation after it happens or noticed on the project. Since the response method has six methods, it may become misleading to compare effectively between stages. Therefore, the following discussion will focus on the methods only.

Once a closer look is taken into the stages to check the methods in each stage, planning method ranks the highest count in terms of hedges suggested by the interviewees as shown in Figure 13. The Response stage has six methods, Avoid, Transfer, Reduce, Share, Enhance and Ignore. However, planning stage has only one method which is planning. Then, there is no doubt that planning method will have all of the hedges related to the planning stage.

Comparing the results using counts of hedges in each stage of method may not be helpful in figuring out most reliable hedges. Then, each method has been given weighted score based on the number of hedges in each method and the level of these hedges as shown in Figure 16 to review the score for each method. As it can be seen from Figure 16, planning method has the highest score. In other words, hedging against inflation at the planning stage is the most recommended by the interviewees. Thereafter, transfer method and reduce method comes in the second and the third place respectively. As it is shown in Table 8, most of the literature reviews are belong to these three methods. In other words, planning method scores the first place in hedges count and reliability.

The literatures also points to the same argument. Some people such as D.Choi, Kim and G. Choi (2009) and Kannadasan (2009) believes that determining the possible risk in the planning phase will help in reducing the time and the cost for project. Jolayemi and Oluleye (1993) also agree by the importance of addressing the inflation impact at the planning stage. The same belief is shared with the interviewees. Similarly, Omran (1991), CDI (2005),

Williams (1980) and Yescombe (2002) suggest to transfer of risks beyond the project financial capacity to an insurance party. This is can be considered as a support to have transfer as a second effective method in hedging. It is worth mentioning that the transfer method contains only three tools. They are fixed price contract, long term contracts and insurance.

5.3 Validation Survey

As a Validation procedure to the interviews findings, a survey was done to get some input from more people on the interviews findings. The survey shown in the next figure was sent to people who are currently working as project managers or have a project management background. The survey was developed using a website called <http://freeonlinesurveys.com>. To make the survey easy to complete, multiple choices options was selected. The survey included one question to guarantee the maximum participation. The survey link was sent to the surveyees though an email. The total number of respondents is 26 which is acceptable. The survey result is shown in Figure 17. To have more information about the survey questions, please refer to Appendix C.

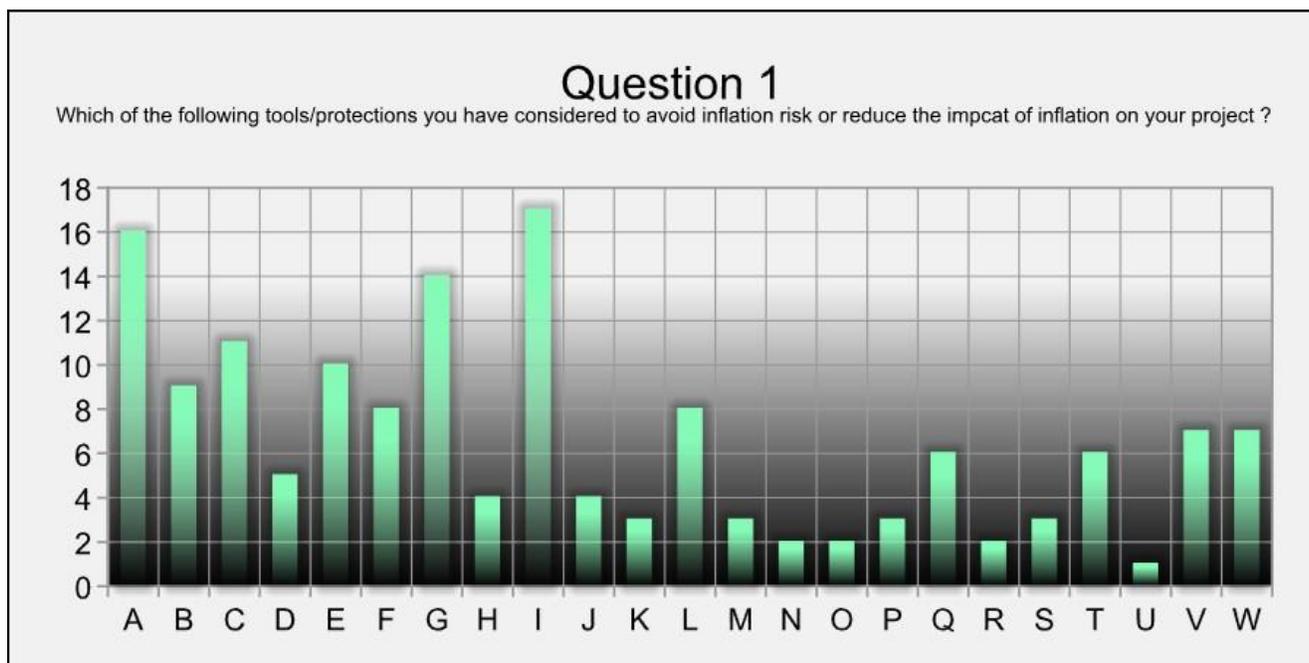


Figure 17: The result of the Validation survey that was done to confirm the interviews findings.

Filtering the result is very important since the objective of the research to find out the most effective hedges to avoid the risk of inflation on projects. To achieve that goal though filtering the most preferred hedges by the surveyees, the hedge that collected 40% or more of the votes (10 votes), will be considered in our discussion.

From the above figure, it can be noticed that Fixed Price Contract (Transfer) ranked as the first hedge preferred by the survey (17 votes or 69% of the votes). Then, Understanding Project Variables (Planning) ranked as the second hedge preferred by the surveyees (16 votes or 65% of the votes). Next, Proper Cost Estimation (Planning) ranked as the third hedge preferred by the survey (14 votes or 57% of the votes). Company Strategy in taking the risk (Planning) ranked as the fourth hedge preferred by the survey (11 votes or 46% of the votes. Cost of Managing the inflation itself (Planning) ranked as the fifth hedge preferred by the survey (10 votes or 42% of the votes).

From the above findings, it can be noted that the most commonly selected hedge by the surveyees is the fixed price contract. However, the other four most selected hedges via the survey belong to the planning method. What can be understood from this finding is that the surveyees believe that most of the hedges can be done in the planning stage. This is corroborate the findings of the interview results and the literature review. However, they prefer to have a fixed price contract to hedge from inflation.

Fixed price contract belongs to the transfer method. One possible justification is that human nature normally tends to be in the comfort zone and tries not to confront problems. Fixed

price contract is the best tool to do so and have a peace of mind. The second possible explain is that other hedges, related to other methods, may not be that common in the middle east market since the derivatives market or the insurance market is not mature in the region.

Referring to one of the notes made by Toker on the Fixed Price contract, he says that the cost of selecting the fixed price contract as a solution to hedge from inflation contains the risk of inflation. Every contractor will try to have a safe cost margin in his cost estimation to avoid the risk of inflation during the project life time. That consideration will increase the contract price. Therefore, the project manager pay for the inflation in advance.

As a conclusion, the fixed price contract is the proffered hedge, however, it includes the inflation rate in the contract price. The extra cost for the fixed price contract can be considered as a premium for being protected from inflation. It is worth mentioning the fixed price contract is more practical if the contractor is well know firm. Saying that, the stronger the firm, the more ability to absorb the price increase if the inflation hits the economy. Therefore, the project will not be canceled because the contractor can not afford the financial consequences of the fixed price contract.

The least selected hedge as per the survey are Ignoring Inflation, Partial Hedging and Interest Rate Swap. For Ignoring inflation, it has been ranked as Level One hedge which matches the survey result. The justification for this could be most of the people interviewed or surveyed do agree on that inflation is a serious risk and something has to be done to avoid it impact. For partial hedging, it has been ranked as Level One hedge. At the same time, no

literature reviews were found that talks about this hedge. It can be concluded that the survey results and the interview results do corroborate. Finally, Interest Rate Swap, has been ranked as a Level One hedge. On the other hand, no literature review was found on this subject. Therefore, this is not reliable or not commonly used based on the interviews and the survey results.

Hedge Level	Planning	L.R.	Avoid	L.R.	Transfer	L.R.	Reduce	L.R.	Share	L.R.	Enhance	L.R.	Accept	L.R.	Monitor	L.R.											
Level 4	Proper Planning	D.Choi, Kim and G. Choi (2009) and Kannadasan (2009) Taylor (2003) Jolayemi and Oluleye (1993) Kannadasan (2009) National Treasury (2001)			Fixed Priced Contract	Williams (1980) and Yescombe (2002)																					
	Project Variables	(ADB) (2007) Yescombe (2002) El-Sayiegh (2008)																									
	Cost Estimation	Moir (1976) Mior (1973), Kannadasan (2009) and Yescombe (2002) Oxendine (2001)																									
Level 3					Long Term Contract	IMF (2008) Yescombe (2002) IMF (2009)	Commodities	Woods (2009) and Kibble and Pentic (2010) Wang (2010) Woods (2009)																			
					Insurance	Jun (2007) Kwak and Dewan (2001) Omran (1991) and CDI (2005) Pella (2005) GEM (2007) Oxendine (2001) Louberg and Wattc (2008)																					
Level 2	Considering Country Regulations	While Wang, Dulaimi and Aguria (2004)							Coordinate With Other Competitors	El-Sayiegh (2008)																	
	Resources Management And Post Cost Reduction	Jolayemi and Oluleye (1993) (ADB) (2007)																									
Level 1	Project Visibility	Moir (1976)	Interest Rate CAP	EFG (2009)			Us Bonds	Kibble and Pentic (2010), National Treasury (2001) and Lunitel and Paudyal (2006) Weinberg (2003) Woods (2009) Sondergeld (2004) HART (2009)			Final Product Specialty	Wang, Dulaimi and Aguria (2004) and Woods (2009)	Ignoring Inflation	Wang (2010) and Gtassman (2006) Mior (1976)	Track Inflation Rate Changes	Delvalle (2008) Taylor (2003) Yescombe (2002).											
	Company Strategy In Risk Taking					Deal With Manufacturer Directly																					
									Interest Rate Swap																		
	Cost Of Managing Inflation								Credit Default Swap																		
									Exchange Rate	Kwak and Dewan (2001) IMF (2009) Lim and Papi (1997), Leo (2007) Sekine (2001), Khan																	
									Partial Hedging																		

Table 8: A comprehensive table that includes all hedges found from interviews that been classified based on the hedging methods and the literature review belongs to each hedge.

Chapter Six

6. Conclusion & Recommendations

6.1 Conclusion

Although some of the researchers consider the inflation as a positive element that helps the economy to start growing and helps borrowers to pay their loans with cheaper dollars (Yescombe 2002), it is widely believed that inflation is risky and its consequences can postpone or cancel projects. Therefore, inflation needs to be considered as a real and serious risk to today's projects.

From the findings discussed in the previous chapter, it can be noticed that the most common selection by the surveyees is the fixed price contract. However, the other four most selected methods, understanding the projects variables, Proper cost estimation, company strategy in taking the risk and cost of managing the inflation, via the survey belong to the planning method. What can be understood from this finding is that the surveyees believe that most of the hedges can be done in the planning stage. This matches the finding of the interview results and the literature review.

Fixed price contract is the most preferred hedge by the surveyees. Fixed price contract belongs to the transfer method. Explaining this result may be because that human nature normally tends to be in the comfort zone and tries not to confront problems. Or, other methods may not be that common in the Middle East market since the derivative market or the insurance market is not mature in the region.

The least preferred hedges as per the survey are Ignoring Inflation, Partial Hedging and Interest Rate Swap. For ignoring inflation, it has been ranked as Level One hedge which supports the survey result. The justification for this maybe is that most of the people interviewed or surveyed do agree on that inflation is a serious risk and something has to be done to avoid it impact. For partial hedging and Interest Rate Swap, the survey results support the interviews and the literature review results as well. The planning method/stage scores first place in terms of hedges counts and reliability which is reflected in the results of the interviews. Since 4 out of 6 most preferred hedges belong to the planning method/stage. However, fixed price contract remains the preferred hedge.

One of Scorates's famous saying is "*the life which is unexamined is not worth living*". Hedges from inflation are available in the market. However, it is the ultimate responsibility of the project manager to understand the project variables, such as the project funding type and project duration, and objectives to decide which hedges suits the project the most and the next stage is to examine them. Some hedges that we think useless work perfectly for some other types of projects. In other words, it can be said that a project manager shall explore and examine different hedges based on the variables of the project to control the risk of inflation.

6.2 Recommendations

According to the research findings and discussion, it can be recommended that:

- Project Managers have to seriously consider “Fixed price contract” as the most common and reliable hedge to avoid the inflation impact on projects. Although this type of contract is more expensive, however, they secure the project fully from any cost escalation caused by inflation.
- Project Managers have to consider other hedges such as understanding the projects variables, Proper cost estimation, and company strategy in taking the risk are common and reliable hedges to use. As it has been shown, most of the effective hedges can be done in the planning stage. In other words, the more research and work done in the planning phase, the better the project manager can control the inflation risk.
- The least selected hedge as per the survey is Ignoring Inflation, Partial Hedging and Interest Rate Swap. For ignoring inflation, it has been ranked as Level One hedge which corroborate the survey result. The justification for this maybe is that most of the people interviewed or surveyed do agree that inflation is a serious risk and something has to be done to avoid it impact. For partial hedging, it has been ranked as Level One hedge. At the same time, no literatures were found that talk about this hedge. It can be concluded that the survey results and the interview results do match. Finally, Interest Rate Swap has been ranked as a Level One hedge. On the other hand, no literature review was found on this subject. Therefore, this is most probably not reliable or not commonly used based on the interviews and the survey results. As a conclusion, it would be recommended that the project manager neglect considering the above three hedges.

- There is no good and bad hedge. All hedges are good if they have been selected based on a good understanding of the project objectives and variables.
- Hedging from planning stage is the most reliable way to respond to inflation. The results of the literatures, interviews and the Validation survey support this conclusion. The project manager has to put more focus on this stage.

6.3 Further Studies

The topic of the research is very rich. While searching for references, it was found thousands of articles talk about inflation in general. However, there were few articles covering the impact of inflation on specialized areas. It is suggested that studying fixed price contract in particular since it is found as a common hedge used by project managers. Moreover, it will be a great idea to study how a project manager can develop a precise inflation rate expectation and integrate it into project management process. One possible future research is to investigate how a project manager can practically invest the money allocated for a project in proper channels to keep the purchasing power of the money unchanged over the time. Additionally, one of the topics that can be studied in future research is finding the hedges that suit the Islamic financial system, which never deals with interest rates. A final suggestion is the next studies can explore if the market of hedges in the UAE is lacking in advanced hedging tools such as the financial derivatives, insurance or bonds.

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Appendix A: Literature Review Categorization

	D	E	F	G
	Caption	Writers	Page	Reference
1				
2				
3	Each party is responsible for obtaining their own workers' compensation insurance, builder's risk insurance, and liability insurance policies. However, under the alternative approach, insurance for construction projects is purchased by the facility owner or prime contractor. This alternative is known as a controlled insurance program.	Pella (2005)	1	Pella, E. A., (2005), "ASSESSMENT OF CONTROLLED INSURANCE PROGRAMS FOR CONSTRUCTION PROJECTS", University Of Florida, Athesis for master degree in Building construction.
4	Controlled insurance programs are used to provide insurance coverage for the entire construction project through a single insurance policy. Instead of each contracting party providing their own insurance, as is the case in the traditional method of obtaining insurance, the insurance is provided for all contracting parties under one consolidated insurance program provided by one insurance carrier. The controlled insurance program may be acquired by the owner of the construction project or by the prime contractor in charge of the construction project.	Pella (2005)	2 and 1	
5	Typical insurance coverage objectives for owners and contractors are to reduce accident rates, reduce the number of injuries, prevent property damage, and maintain the timely completion of construction projects.	Pella (2005)	3	
6	Table 1	Pella (2005)	6, table 2-1	
7	Advantages and Disadvantages. The major advantages of CIPs are cost savings from buying insurance in bulk, cost savings from eliminating contractor markups, obtaining broader insurance coverage and higher coverage limits, eliminating duplication and gaps in coverage, increasing small and minority subcontractor participation, handling claims more efficiently, reducing potential litigation, eliminating disputes between insurance companies, enhancing workplace safety, and earning premium returns for favorable loss experiences	Pella (2005)	11	
8	Because a CIP is purchased as a whole, the sponsor is able to achieve an economy of scale which allows for greater negotiating leverage with insurance carriers. This volume purchase of insurance gives the owner or the prime contractor tremendous buying power resulting in lower insurance premiums than the contractors could obtain on an individual basis (Bukowski 1996, Collier 1994, "Don't Overlook" 1995, Houweling 1999, O'Gara 2001, USDOT 2003). CIPs also eliminate contractor markups on insurance costs because all contractors and subcontractors are required to remove the cost of insurance from their bids ("Airport Construction" 1998, Bukowski 1996, USDOT 2003).	Pella (2005)	13	
9	Because one party is responsible for managing claims under a CIP, the use of a CIP allows for a more centralized and efficient method of managing claims ("Airport Construction" 1998, Johnson 2002).	Pella (2005)	15	
10	The down side of a CIP is that an insurance policy covering every contractor on a project can be administratively challenging ("Airport Construction" 1997, Houweling 1999, Ron Rakich and Associates 2000). Owners and contractors need to be aware of the increased administrative burden and the increased administrative costs that are incurred with a CIP (Federal Transit Administration 2003, Nilsson 2003, Schexnayder et.al. 2004, USGAO 1999).	Pella (2005)	19	
11	CIPs require additional administrative burdens, a significant level of effort and expertise, additional accounting efforts requiring the extraction of insurance costs from contractor bids and change orders, an additional monitoring effort requiring the CIP administrator to ensure that claims from a contractor's employees who are injured on other projects are not charged to the CIP, and increased owner responsibility for implementing effective safety and loss control programs (Grenier 2004, Nilsson 2003, "The State" 2003).	Pella (2005)		
12	Table 2	Pella (2005)	Table 2-3	
	Whether you are contemplating starting a new business, are a new business owner, or have owned a business for many years, commercial insurance can be one of the most important ongoing financial investments you make in the life of your company. Operating a business is extremely challenging			

Appendix A 1: All citations have been imported to an Excel sheet to get them organized in one page. This help in having a quick look on all citations at once.

<p>A Risk Planning :-</p> <ul style="list-style-type: none"> Addressing the risk to consider risk in scheduling, cost Capital budgeting Cash flow planning inflation accounting Cash flow forecasting Cost estimation establish an allowance in the budget to be used in case of inflation 	<p>B Risk Response</p> <p><u>Transfer the risk</u></p> <p><u>Avoid the Risk</u></p> <p>Insurance</p> <ul style="list-style-type: none"> Fixed/Firm Price Contract (lump sum) <p><u>Fixed</u></p> <ul style="list-style-type: none"> Fixed interest rate on fund (loans) 	<p>(Don't Do it)</p> <p><u>Avoid the Risk</u></p> <p>Can not be avoided.</p> <ul style="list-style-type: none"> Avoid projects type that experience inflation effects more often modify project schedul or SOW to avoid inflation fixed or pre-determined prices with material & accessory facilities supplier. Insurance Option long-term stock investment 	<p><u>Reduce Risk</u></p> <ul style="list-style-type: none"> Corporate linked - Inflation - Bond CPI future Fixed Price + incentives Total Return Strategy Stocks Fixed Income Bond (Home or host Country) Treasury inflation protected stocks Commodities (gold, land, oil, gas) Use Dollars & Bond Steady financing Long term contract with pre-determined price Contract pricing based on Inflation index limited risk accounts. Commodities (land) 	<p><u>Share Risk</u></p> <ul style="list-style-type: none"> Cost plus contracts 	<p><u>do nothing</u></p> <p><u>Accept Risk</u></p> <ul style="list-style-type: none"> if you can do nothing there are some advantage to accept inflation 	<p><u>Enhance Risk</u></p>
<p>24</p>	<p>C Risk monitor & Control</p>	<ul style="list-style-type: none"> TIPS mutual funds ETF Dollar Short long bond Non-directional hedge ladder NFR strategies PCRAX VIPS CTB 				

Appendix A 2: Initial hand sketch to summarize the hedges that were found from the literature review. They have been categorized as per the risk management strategy defined by Taylor (2003).

	A	B	C	D	E	F	
1		113		<p>HISTORICAL PERSPECTIVE <i>Inflation</i> It can threaten the usefulness of money and disrupt society. Even the simplest borrowing and lending can be jeopardized. Accompanied by high interest rates, it was possibly inflation that led to regulations against usury in ancient times. Regulations on interest charges appear about 3,750 years ago in the Code of Hammurapi of Babylon and subsequently in the b i b l i chapters of Exodus, Leviticus, and Deuteronomy [78]. Also, in another ancient comment, Aristotle in his Treatise on Ethics, objected to the concept of interest on the grounds that currency is inert and does not have an organic ability in itself to grow. Modern thoughts on inflation are linked with money wpply. A dscourse on inflation consistent with monetary explanations was published by Jean Bodin in 1578. He gives five causes of inflation and points to the primw problem at that time. As translated from the French: In this we see clearly that just as much as we increase the rate of money we lose that amount by it, for from this comes the great inflation that exists in all things, which causes a general poverty in this kingdom 132 (p.10)].</p> <p>The principal and almost only reason (though no one up to the present has touched upon it) is the abundance of gold and silver which today in this realm is greater than it has been for four hundred years. I do not go any further, as the records of the coun a chamber do not pass indeed four hundred ye an...[32 (p.230)]. He is speaking of all the problems in the European monetay syst caused by the gold and silver mined in South America and shipped to Spain1 Another aspect to inflation is how governments e right to manufacture money. They can iswe cunency freely and pay no interest on it, even though this represents 'borrowing' fr With inflation, storing currency in a bank vault (or under a mattress) represents a loss to the holder.</p>	Delson (1992)		73
2		123		Figure 9	McMahon (2008)		
3		99		<p>I. INTRODUCTION In the last two decades, countries around the world have experienced price stabilization, but significant and persistent movements in asset prices. Because the inflation have been controlled effectively, and the fluctuation of asset prices and instability of financial system are the main questions that the policy makers pay attention to.</p>	Chang (2009)		
4		94		<p>Specifically, we investigate the effects of both inflation and inflation uncertainty on output growth in Mexico at business cycle frequencies. We study Mexico because it is a large, growing economy that is becoming an increasingly significant export market for the United States.1 Further, the range of inflation experience is much wider in developing countries in general, and Mexico in particular, than in most rich countries. Developing countries provide a natural laboratory for empirical work on the real effects of inflation and inflation uncertainty and they are the polities most in need of effective inflation policies.</p> <p>That is, we find that inflation uncertainty significantly lowers output growth and, as predicted by Friedman (1977) and Ball (1992), inflation uncertainty is higher at high levels of inflation. The direct effect of average inflation on output growth is estimated to be positive but this is outweighed by average inflation's positive effect on inflation uncertainty, which significantly lowers</p>	Grier and Kevin (2006)		
					Grier and Kevin (2006)		

Appendix A 3: All the citations have been tabulated using MS Excel program. The citations have been categorized based on Taylor (2003) definitions. Each related citation has been grouped in one page. The goal of this is to segregate related literature for a better presentation.

	A	B	C	D	E	F	G	H	I	J
1		24		<i>It was found that Inflation and sudden changes in prices ranked the first among the top ten most significant risks according to international companies and local companies. The survey covered 65 respondent from different countries and companies.</i>	<i>EI- Sayiegh (2008)</i>	436				
2		190		<i>After achieving an impressive success in maintaining price stability over the last two decades, inflationary pressures have emerged since 2003 in all GCC countries with the recent oil boom putting tackling inflation on top of the agenda for policy makers in the region. Some have blamed these pressures mainly on the peg to the weakening U.S. dollar, others on global shocks related to high food prices, local supply shortages related to rent, and demand shocks induced by large fiscal spending and an expansionary monetary stance imported from the U.S. through the dollar peg. Accordingly, the remedies proposed include revaluation or adopting more flexible exchange rate regime to gain monetary policy independence, higher subsidies, addressing supply bottlenecks, and containing government expenditures.</i>	<i>IMF (2008)</i>					
3		182		<i>Figure 10</i>	<i>IMF (2009)</i>					
4		185		<i>Foreign and domestic factors explain inflation in GCC countries. Among foreign factors, inflation in major trading partners appears the most relevant to domestic inflation in GCC. Higher inflation in trading partners has pushed prices upward in four GCC countries in the long-run, including in Saudi Arabia, the largest country in GCC. The sustained inflationary pressures in response to higher inflation in trading partners was made possible through an accommodating monetary policy, reflecting high international reserves across most of the GCC. Moreover, fixed exchange rate systems have restricted flexibility to adjust the exchange rate and mitigate the effects of external shocks on domestic inflation.</i>	<i>IMF (2009)</i>					
				<i>Exchange rate depreciation, relative to major trading partners, could reinforce the increase in import prices and the inflationary effect of external shocks. The recent downward trend of the U.S. dollar, the currency of the peg in the majority of GCC, has drawn attention to the effect of nominal effective exchange rate depreciation on higher inflation. In support of the pass-through channel, nominal effective depreciation has a</i>	<i>IMF (2009)</i>					

Appendix A 4: In each Excel page, the citations, the Authors, the article page numbers and the reference for that article were shown next to each other for a better understanding and writings in later stages of the research.

	A	B	C	D	E	F	G
1		26		<i>Abstract –With the rapid enhancement of product functions and performances, the cycle of technological innovation is becoming shorter. Accordingly, it is difficult to meet various customer needs due to increased development costs and the shortened development period. This also has a significant impact on establishing corporate strategies. Successful product development is essential to the survival of a company in the competitive market. A company needs to identify the diverse risk factors that might occur in the development process, measure how much they will affect the development process, and create strategies and tactics to counter them.</i>	<i>D.Choi, Kim and G. Choi (2009)</i>		
2							
3		27		<i>A product development project can determine the success and failure of the manufacturing industry. However, many companies see such projects as extremely difficult tasks because of the high investment costs and chances of failure. Approximately 80 % of globally-conducted product development projects fail while they are in progress. Even the 20% of completed projects took more costs and time than expected [1]. That was because they failed to recognize the risks and risk degrees in advance and there was no systematic way to effectively deal with the risks that occurred in the middle of the project.</i>	<i>D.Choi, Kim and G. Choi (2009)</i>		
4		29		<i>Following the gradual process of disinflation over the last two decades the consensus that the paramount objective of monetary policy is to safeguard against the danger of high inflation appears to be disintegrating. It is being replaced by the realization that high inflation is but one of the dangers facing policy makers.</i>	<i>Kilian and Manganelli (2003)</i>		1
5		30		<i>The project risks are uncertain factors inside the project system which exist in any project. Infrastructure project is an assembly that contains all kinds of comprehensive social activities in the field of economy, technique, management and organization, etc., where uncertainties exist at every aspect. These risks could result in losing control of the project implement, such as complete time extend, cost increment, plan modification, and so on, ultimately cause economic performance of project lower even project failure. In addition, generally infrastructure project is large-scale, the technique is novel, continuous time is long, the number of participant is big, connection with environment is complicated, and so the crisis in the project may occur frequently.</i>	<i>Jun (2007)</i>		2396
6		31		<i>We reviewed some recent advances in the literature on risk management that help us understand the language used by central banker's in describing their policy objectives and operating procedures.</i>	<i>Kilian and Manganelli (2003)</i>		17
7		32		<i>The risk analysis process assists the effective and efficient operation of the organisation by identifying those risks which require attention by management.They will need to prioritise risk control actions in terms of their potential to benefit the organisation.</i>	<i>AIRMIC, ALARM and IRM (2002)</i>		10
8		33		<i>figure 1</i>	<i>AIRMIC, ALARM and IRM (2002)</i>		3

Appendix A 5: The main page that contains the citations that had been grouped based on Taylor’s (2003) definition. In addition, some other citation that suits the introduction or inflation in GCC or risk management were grouped as well.

A	B	C	D	E	F	G
13	66		<i>From the foregoing argument, there is little doubt that business in general, including the statutory authorities, can benefit from the application of inflation accounting. It has a vital role to play, both as an aid to decision making and as methods of bringing more realism into commercial accounts.</i>	Moir (1976)	184	
14	74		<i>Macro economic instability has necessitated that expectations about the future rate of inflation be taken into consideration in making decision(s) about which capital projects will be undertaken by a firm. Nominal cash flows determine its degree of profitability. However, in making the capital budgeting decision both real and nominal concepts must be considered.</i>	Mills (1996)	79	
15	54		<i>The growing internationalisation of business brings stiff competition which requires a proper evaluation and weightage on capital budgeting appraisal issues viz. differing project life cycle, impact of inflation, analysis and allowance for risk. Therefore financial managers must consider these issues carefully when making capital budgeting decisions. Inflation is one of the important parameters that govern the financial issues on capital budgeting decisions.</i>	KANNADHASAN (2009)	1	
16	149		<i>In preparing the construction cost budget, however, an allowance has to be made for inflation over the construction period in costs that are not fixed, such as the Project Company's general personnel costs, and purchase of any items (such as spare parts) not included in the scope of the EPC Contract</i>	Yescombe (2002)		
17	105		<i>It is always difficult to assess the profit-ability of proposed or existing projects but such difficulty is greatly increased when infla-inflationary conditions are present. The term infla-tion is itself imprecise and for purposes ofpresentation will be considered to have anidealized form called general, or open, infla tion and a more frequently occurring form called differential or repressed, inflation Under conditions of constant momentary value the most popular methods used to assess the profitability of a project are respectively the discount cash flow rate of return (DCFRR) and the net present value (NPV)</i>	Watson, and Holland (1977)	207-208	
18	76		<i>In another early article dealing with the subject, Van Horne [16] showed that to be consistent, inflation in forecasting cash flows must also be reflected in a discount rate containing inflation; that is, a bias was introduced if nominal cash flows were discounted at the real and not nominal cost of capital. Cooley, Roenfeldt and Chew revealed the mechanics by which inflation adjustments can be incorporated into the capital budgeting process [6]. At the same time, Nelson [12] demonstrated the theoretical impact of inflation on capital budgeting and showed how inflation would shift the entire NPV schedule of a capital budget downward for a set or projects. Bailey and Jensen [1] have analyzed how price level adjustments affect the process in detail and specifically how various price level adjustments might change the ranking of projects.</i>	Mills (1996)	79	
			<i>In a non-inflationary world, funds loaned at a rate of interest return at a rate equal to the stated or nominal rate of interest. If</i>			

Appendix A 6: The risk management strategy by Taylor (2003) consist of three stages. They are planning, response and monitoring. Additionally, in each stage, there are sub-stages termed as "Methods".

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	A	B	C	D	E	F	G	H	I
1				Conclusion The insurance option as an innovative product is a valid measure that dissolves harmful factors in infrastructure project insurance, also is creative technique to transfer the risk of project insurance and strengthen the ability of insurance company. Based on enhancing the ability of whole indemnification of project insurance, a large-scale risk in project can be transferred to the capital market with more liquidity and endurance. The risk and its management methods of infrastructure project are analyzed in the paper, the strategy of the insurance options development in China is put forward. The price theory of Black-scholes option is discussed at the same time, especially the pricing method that could keep up with project insurance option is put forward. Naturally it will offer beneficial reference for the insurance securitization in China by transplanting all kinds of advantages of the option into infrastructure project insurance.	Jun (2007)				
2		83		Conclusions In this paper, we focussed on insurance purchasing when the insured risk is endogenous by considering the case of a risk averse firm endowed with a risky investment project. The project may fail partially due to some exogenous state of nature, but the resulting loss is insurable. The firm is financially constrained by a fixed budget — including borrowed funds — to be allocated to the project. Increasing insurance coverage means having less funds available for the investment itself.	Louberg and Watte (2008)	2401			
3		109		Firm Price Budgeting Opinions have always differed sharply as to the merits of whether to let a contract on a fixed or firm price basis and who benefits in the end. In times of rapid inflation there is a very strong argument that the fairest method to both seller and purchaser is to let a contract on a completely reimbursable basis .	Williams (1980)	308			
4		68		Obviously as the inflation rate falls and becomes more predictable then clients are going to demand fixed lump sum prices .	Williams (1980)				
5		69		Fixed Price Contracts: it is so easy to fall into a trap in times of depressed demand and spare capacity, the temptation to pare the margins to a low level and hope everything will go well is very great. There have been several examples in recent years where fixed price contracts have been taken by contractors and the final outcome has caused a severe strain on the balance sheet.	Williams (1980)				
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Reff / Introduction to inflation / Inflation in GCC / Risk Mngt / Risk Planning / Risk Response / **Avoid** / Transfer / Reduce / Share / Enhance / Accept / Risk Monitor / Reff List / summary

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Appendix A 7: In planning stage, there is only one method called "Planning" method. However, in the Responses stage, there are the six methods and "Avoid" is one of them.

	A	B	C	D	E	F	G	H	I	J
1				<i>Especially international organization FIDIC lists the project insurance as the essential item of the construction contract, the project insurance system is developing quickly in many countries. The project insurance did great contribution to development of the infrastructure in China 31. After all the insurance company is different from the public finance department in nature, it must keep to the general rule in the insurance market and promote virtuous circulation of the insurance funds. The safety of the insurance itself must be look after when carrying on the national industry policy, so it is important to enhance the ability of project risk management.</i>	Jun (2007)					
2		87		Currency Exchange Rate International development projects invariably involve import of equipment and/or services from industrialized countries, which makes it all the more necessary for the project manager to have a working knowledge of the existing foreign exchange regulations. In addition, inflation, devaluation, shortage of foreign exchange resulting in limiting foreign exchange practices aimed at conserving it is a fact of life in developing countries. Due to restricted regulations, many companies have ended up with their project development funds blocked in recipient countries. Ellis (1988) suggested the following techniques for solving blocked funds problems: <ul style="list-style-type: none"> • Receive contract payments in dollars • Increasing the margin from parent company to the subsidiaries • Parallel loans between subsidiaries of separate companies • Purchase of host country dollar bonds • Transferring only net amount to subsidiaries • Increasing local purchases • Capital investment of the blocked funds in the host country • Gifts to charities • Substitution and counter trade of equivalent value • Insurance • Applying pressure on the government. 	Kwak and Dewan (2001)		2398			
3		47		<i>Summary: Insurers can provide valuable financial support to major projects by accepting risks that are either outside the main participants' control, or, if they are within their control, are beyond their financial capacity. Insurers' involvement, however, may well depend on a risk analysis that confirms that the risk meets insurability criteria, and that assists them to quote terms. Completion</i>	Omran (1991)					
4		45		Each party is responsible for obtaining their own workers' compensation insurance, builder's risk insurance, and liability insurance policies. However, under the alternative approach, insurance for construction projects is purchased by the facility owner or prime contractor. This alternative is known as a controlled insurance program (CIP) .	Pella (2005)					
5		1		Controlled insurance programs are used to provide insurance coverage for the entire construction project through a single insurance policy. Instead of each contracting party providing their own insurance, as is the case in the traditional method of obtaining insurance, the insurance is provided for all contracting parties under one consolidated insurance program provided by one insurance carrier. The controlled insurance program may be acquired by the owner of the construction project or by the prime contractor in charge of the construction project.	Pella (2005)		1			
6		2		Typical insurance coverage objectives for owners and contractors are to reduce accident rates, reduce the number of injuries, prevent property damage, and maintain the timely completion of construction projects.	Pella (2005)		2 and 1			
7		3		Table 1	Pella (2005)		3			

Appendix A 8: “Transfer” method is another method belonging to the response stage. It can be noticed that all related literature that belongs to transfer method are collected in this Excel page.

	A	B	C	D	E	F	G
1							
2							
3		25		The UAE construction industry is very active. Every day, there is an announcement of a new mega construction project. The number, size and complexity of new construction projects are increasing resulting in extra risks. The top ten risks can be attributed directly to this phenomenon. The results of this study show clearly that inflation and sudden changes in prices is the highest risk in the UAE construction industry. Fifty five percent of the respondents indicated that this risk should be shared between the owner and contractor while 38% indicated that it is contractors' risk. Owners in the UAE are reluctant to share this risk with contractors. This allocation problem results in overpricing on the contractor bid to overcome this major risk.	El-Sayiegh (2008)	438	
4		53		Sell foreign firm's shares to local public and local government to get their help	Wang, Dulaimi and Aguria (2004)	244	
5		53		Mitigation measures for risk #C2: inflation and interest rates Ensure that a reputable owner through international institute, e.g. ADB or World Bank, finances the project Adopt as much as possible domestic product/labour to reduce cost	<i>Wang, Dulaimi and Aguria (2004)</i>		
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Appendix A 9: It can be noticed that all related literatures that belong to "Share" method are collected in this Excel page.

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A	B	C	D	E	F
1	36	<p>RISK RESPONSE</p> <p>Risks may be viewed as negative or positive. Negative risks are those that might impact the ability to reach project goals.</p> <p>Positive risks are those that can be exploited, as opportunities, for positive benefits. Responses to negative risks may include the following:</p> <p>Transfer the risk. PMBOK describes this as a risk transference that requires shifting the negative impact of a threat to another party. Buying fire insurance is an example of risk transference. If the insured house is destroyed by fire, the impact falls on the insurance company, not the owner.</p> <p>Avoid the risk. Changing the scope, schedule, or available resources of a project may result in risk avoidance. Other risks may be avoided by relaxing or clarifying product requirements, obtaining additional information, or bringing in more skilled personnel.</p> <p>Reduce the risk. If risks cannot be completely avoided they may be reduced (mitigated) by the same means as avoidance but having a lesser effectiveness.</p> <p>Share the risk. Risks may be shared between two parties where both participate in the impact of an actual risk condition. Using share ratios in cost-plus or fixed-price incentive contracts is a common way to share the negative impacts of risks.⁷ Taylor</p> <p>Increase risk tolerance. When risk responses cannot completely eliminate a threat a tolerance for some residual effects must be accepted.</p> <p>Accept the risk (do nothing). In some cases risks cannot be avoided, mitigated, transferred, or shared. In such cases potential risk impacts must be accepted. This is usually the most inferior response to project risks.</p> <p>Product Modeling. Modeling a new product early in the project will determine if its requirements can be met. If this is demonstrated prior to the final acceptance of a new product's design, significant risk impacts can be avoided. Responses to positive risks (opportunities) may include the following:</p> <p>Exploit the Risk. This strategy takes advantage of risk uncertainties that might be turned into benefits. For example, it may be possible to not only meet a customer's expectations but to go beyond them. This extra effort may present obstacles but if achieved it may produce a higher degree of customer satisfaction and cause the customer to keep coming back for more.</p> <p>Share Ratios. As described previously, share ratios can be used to place the impacts of negative risks on two parties; however, they can also result in a benefit to both parties under contract when actual project costs fall below target costs. Customers reap the benefit of well-managed subcontracts, and subcontractors reap the benefit of achieving a higher fee.</p> <p>Enhance the Risk. Enhancing a risk involves the pursuit of activities that might produce a greater return-on-investment. This is accomplished by strengthening or maximizing the chances for a positive benefit.</p>			
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Appendix A 10: All related literatures that belong to "Response" Stage are collected in this Excel page.

	A	B	C	D	E	F	G	H
1				<p>HEDGING VS. TOTAL RETURN STRATEGIES Investors can prepare for unexpected inflation by following one of two basic strategies—hedging the immediate effects of inflation or earning a total return that outpaces inflation over time. Hedging involves choosing assets whose value tends to rise with inflation. Although holding these assets may reduce the total return of a portfolio, the positive correlation with inflation can help an investor keep up with rising consumer prices, at least over the short term. (Correlation refers to the co-movement of asset returns. When two assets are positively correlated, their returns tend to move together; when negatively correlated, their returns are dissimilar.) Candidates for hedging include retirees, fixed income investors, and others who would experience a diminished living standard during an inflationary period. These investors are willing to forfeit long-term growth potential for more immediate inflation protection. In a total return strategy, an investor attempts to outpace inflation by holding assets that are expected to earn higher real (inflation-adjusted) returns. This investor is willing to give up short-term inflation protection for an opportunity to grow real wealth.</p>	Kibble and Pemic (2010)			
2		38				1		
3		39		<p>STOCKS Equity securities have provided a positive inflation-adjusted return over the long term. From 1926 through 2006, the total US stock market, as measured by the CRSP 1-10 Index, outpaced inflation by an average of 6.16% per year.¹ To achieve this higher expected real return in stocks, however, an investor had to accept more risk, as measured by greater volatility in returns, and endure periods when stocks did not outpace inflation. As a result, stocks may be less effective for hedging short-term inflation and more suitable for investors who want to beat long-term inflation by earning a higher total return. Some investors assume that high inflation leads to lower stock market performance, while low inflation fuels higher stock returns. In reality, inflation is just one of many factors driving stock performance. US market history since 1926 shows that nominal annual stock returns are unrelated to inflation.</p>	Kibble and Pemic (2010)			
4		88		<p>Pricing (interest rate or preferred dividend) is the cost of borrowing the funds, and is based on existing market rates plus an amount for risk. Longer-term securities will require higher interest rates than short-term securities, except under unusual economic conditions. Both fixed and variable interest rates may be negotiated. A fixed interest rate transfers the risk of inflation and high interest rates to the lender, who is ultimately rewarded for taking such risk. A variable interest rate structure retains the risk at project level.</p>	National Treasury (2001)	27		
5		91		<p>Overall, our findings suggest that UK stock investments in the long run insulate tax-paying investor from inflation.</p>	Lunitel and Paudyal (2006)			
6		151		<p>Infrastructure stocks also benefit from a defensive income stream, based on low volatility and fairly inelastic demand. Research from JPMorgan Asset Management shows mature toll road assets deliver annual cash yields of 4%-9%, airports 5%-10% and regulated assets such as water businesses 6%-10%. Global Infrastructure Securities has a gross running yield of 6.6% and Jones says it would rank near the top of the equity income peer group over the last year. Key to this income is the inherent inflation pass through many companies in the sector have based on contracts with government bodies.</p>	Martellini (2009)			
				<p>CPI Futures. These creatures will be offered by the Chicago Mercantile Exchange soon after New Year's. Terms have yet to be released on these quarterly contracts, but your down payment may run somewhere between that of an E-mini S&P 500 contract (\$2,850), widely traded by individuals, and a eurodollar futures contract (\$800), which is related to interest rates, as the CPI instrument will be. Certainly futures are always enormously risky. They can be used to hedge. You could go long a Treasury</p>	Weinberg (2003)			

Appendix A 11: All related literatures that belong to "Reduce" method are collected in this Excel page.

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	A	B	C	D	E	F	G	H
1				Mitigation measures for risk #C2: inflation and interest rates Client to secure standby financing (i.e. more than 100% financing commitments when needed)				
2		53			<i>Wang, Dalaimi and Aguria (2004)</i>	244		
3		140		Inflation Hedge #5: Dollar ETFs When inflation strikes, the value of the dollars you hold declines. And when inflation is caused by an increase in the total number of dollars in circulation, i.e., when the Fed ramps up the printing presses, it means the value of the U.S. dollar versus rival foreign currencies also declines. Fortunately, the falling dollar doesn't have to mean a falling investment portfolio. In fact, a shrewd wager against the greenback can put a lot of green in your pocket. Betting against the buck is easy with the PowerShares DB US Dollar Index Bearish Fund (UDN). With UDN, you get performance that is inversely correlated to the movement of the U.S. Dollar Index . This ETF uses futures contracts on the Deutsche Bank U.S. Dollar Index to achieve its objective, and its contracts are akin to being short the dollar against the euro, yen, pound, Canadian dollar, krona and Swiss franc.	Woods (2009)			
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Appendix A 12: All related literatures that belongs to "Enhance" method were collected in this Excel page.

	A	B	C	D	E	F
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2		144		One of the unintended, though predictable, consequences of the unprecedented rescue of the United States financial system is that there will be higher than average inflation figures for years to come. While it's been popular to dispute the reported Consumer Price Index (CPI), the reality is that the marketplace doesn't really listen to the reported stats. It reacts to reality.	Wang (2010)	
3		189		I doubt, however, that high inflation has been vanquished forever. The smart move is to have assets that can maintain its value weather inflationary storms if they start blowing.	Gtassman (2006)	
4		63		ADVANTAGES OF IGNORING INFLATION - Can ascertain real value distortion of inflation, of funds employed without - Concentrates attention on the basic cost of funding which is rdatively constant compared with the rate of inflation. - Recognises the diftkuity even in the short term, of estimating the rate of inflation. - Avoids having to add a gene& not easily quantified concept (inflation) on to something that is easily quantified 2nd highly specific to a particular firm. - Avoids possibility of double-counting intlation which may already be impkity present in the cosr of capital.	Moir (1976)	
5		61		figure 6	Moir (1976)	183
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Appendix A 13: All related literatures that belongs to "Accept" method are collected in this Excel page.

	A	B	C	D	E	F	G
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2	37		<p>RISK MONITORING AND CONTROL</p> <p>As stated previously, risk management is not a one-time-only effort. New risks may present themselves as projects progress. For this reason project risk teams must constantly be on the lookout for potential risks. New risks that surface at various points in the project must then be subjected to the same risk management process. Risk control takes place when project managers remain aware of possible imminent threats and take adequate measures to implement responses in time. Inserting decision points in the project schedule will prevent project managers from getting caught off guard.</p>	Taylor (2003)	11		
3	122		<p>And the sad fact is, the prices we pay for overseas items will continue to move higher. Over in Asia, they are experiencing some wicked-nasty inflation right now. And it won't stop in the next year, despite a slowdown in U.S. demand.</p> <p>So long as emerging economies like China continue to grow as fast as they are, inflation will continue to be a threat. And the reason why is simple. Because as these emerging economies modernize, they will need more food, more gas, more wood, more metal, more of everything per capita than what they use today.</p>	Delvalle (2008)			
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Appendix A 14: All related literatures that belongs to "Monitor" stage or method, since monitor stage has only one method called monitor, were collected in this Excel page.

Appendix B: Interviews Appendix

Time :
Date :
Venue :
Interviewee : Briane & Lee
Interviewer :

- There is no secret formula to hedge against inflation
- First to find out if your project is feasible or not
- Then, to which limit the project (company willing to take risk)
- Then, cost estimation on historical data
- σ , contingency allowance in the project

* Every project has its own characteristics & special conditions. All together need to be understood first to decide the right hedges suitable * for the project

↓↓
A lot of factors are playing role in affecting the prices inflation. At the same time many factors are affecting the ~~project~~ shaping the limits of a project. Every project manager needs to understand his project limitations, and how much he can be exposed to risk

□ For investing the project money on US bonds → some people or some project finds that the availability of the money is much important than covering the inflation or taking the risk of lending the government your money

■ South America Countries are very good examples for rich place of inflation hedges.

3

Appendix B 1: Some of the notes taken from the interview with both of Lei and Brain Hall. It was found that the notes taken by writing is an easy way of recording the interview dialogue and fast at the same time.

Time : 0900 – 1000 am
Date :27 June 2010
Venue : My Office
Interviewee : Brian & Lee
Interviewer : Mohammed H.

The topic is a complicated topic since many variables are interfering in each other to cause the inflation. The case of having high unpredictable inflation is more noticeable in south America. It should be known that there is no secret formula to avoid or protect your self from inflation. Before starting any project, the project manager need to make sure that the project is visible. Then, the manager need to decided based on the company corporate strategy and the project management strategy to which level the project can be exposed to a risk such as inflation. Normally, at the time of cost estimation, inflation is considered based on historical data. Also, cost estimation or budget has a contingency allowance that can vary from 10% to 50%, depend on the company and the project itself.

Every project has it own characteristics and special conditions that make it different from the other projects.

One of the ways that are commonly used is the fixed price contract. Another way to hedge from inflation is the having long term agreement with the supplier at a predefined prices. This agreement can be indexed to inflation as well.

A lot of factors are playing a significant role in affecting the project budget and set the risk exposure limits. Every project manager have to understand the project characteristics very well to decide to which level a risk can be taken and what are the most appropriate mitigation that can be taken.

For example, investing the project budget in US bonds to hedge against inflation may be a good idea to some projects but not all. To some projects, having the budget cash available on demand is much important to hedge from inflation.

South America Countries are a very good place to search for examples.

Appendix B 2: The transcribet of the interview that had been conducted with Lei and Brain Hall.

Time : 0915 – 1000 am, Date:29 June 2010, Venue: Meeting Room – Teleconference Interview, Interviewee: Alan
Interviewer : Mohammed H.

Alan works as an advisor to Royal Bank of Scotland (RBS) who study the stock market and exchange rate changes and inflation and consequences happen based on them. In each project, all the variable in the project need to addressed. These variable varies from variable with the project nature, project financing method, stockholder's objectives and expectations or with the country the project in. The right hedge can be selected after these variables got addressed in the first place.

Project Funding:

Project fund methods are different. The project fund can be by cash from stakeholders or shareholders, or from a bank as a loan or a loan from a third party. Each method of funding requires the project manager to deal with inflation risk in different way. For example, if the project got funded through a bank, then definitely there will be an interest on the loan. These interest are varying up and down from time to time based on the economy status. The central banks uses the interest rate as a mean to control the inflation in the country by managing the money supply into the economy. Then, as a result, interest rate changes from time to time based on the economy situation. Therefore, if the project manager can manage the interest rate changes, then he can manage the inflation to some extent. It can be understood the inflation is affected by the interest rate. T the same time, the project cost is affected by inflation. Then there is a direct relation between the project cost and the interest rate.

Back to the example of having a fund from the bank. The project manager need to look to the problem from two angles. The first one is Asset side. The project scope of work determine the right protect for the project. For instance, land price and oil price to decide how to respond to inflation. Form the reliability side, the project manager need to consider the project cash flow. If the cost is going up and the revenues is going up as well, then the problem of inflation almost is nothing. On the other hand, if the cost is going up while the revenue is constant, then the problem become more serious. Also, if cost is going up and the revenues will go up after some time, them this is called a time mismatch. In each case different protection need to be considered.

The best way to avoid the risk of inflation is to avoid it at the time of signing off the contract by making the contract a fixed price contract. Again, the project manager need to do some research on the future expectation of the prices. If he anticipated that the future prices most probably will be higher, then a fixed price contract will be the best chose. However, if the price is anticipated to be lower, then a fixed price contract will not be the choice. Project manager need to understand the part of the project that will be affected by inflation and work out a risk protect. Managing inflation in a project is an additional cost to the project. If the cost of managing inflation is higher compared to the risk of having a fixed price contract and the price goes down, then a fixed price contract is a better choice.

Hedges:

One of the common hedges in the market is called Interest Rate Swap. This option gives the borrower to make the variable interest rate a fixed interest rate. Therefore, the risk changing interest rate will be avoided. It the bank think that the interest rate will be 0.5% for this year, 1% in the next your, 2% in the following year, then the bank gave the option to the client to pay the bank a fixed rate of 1 % every year and the bank will make the deference to the lender.(if the lender is not the same bank).

Another kind of hedges is called Credit Default swap (CDS) is hedge is a kind of insurance that protect the loan from the risk of getting the client bankrupted. For example, if a project is, foe some how, a single client. Then, if the client bankrupted, then the project will be affected negatively.

Another technique to hedge is the commodities. It is matter of fact that the more the inflation, the more the prices of commodities. If for example the project intend to buy a new drilling rig and because of inflation the steel price went up. Then the drilling rig went up as a result. Then, there will be a problem in the project capital expenditure. The oil prices have to be above a certinceprice to be in the safe side. Then, the project manger can buy a commodities options from the stock marker (a kind of derivative) which will give the project the option to buy the steel at a predefined price. Call option gives the a hedge from steel price changes if the prices is expected to rise. Put option is a hedge from steel prices changes if it is anticipated that the price will go down.

The project manager can hedge a part of the project if he thinks that this part of theories will be affected by inflation. For example, it was found that, from a research, a variable X is correlated to inflation by 90% of the times, however, variable Y is correlated by 20% to inflation. Then it is better of the project manager to focus on variable X and hedge against the price change of variable X.

Another option is called interest rate CAP. This option assure that the interest rate on a loan will not go above a certain level.

The selection of the hedge need to consider the project liquidity. Some hedges are available in a small amount in the market, for big projects, it maybe difficult to buy the hedges from the market since there will be less hedge contract available.

One more thing to consider is the country specialty in terms of politics, religion or maybe location. For example, Saudi Arabia is an Islamic country that prohibited the use of financial derivative. Then, for a project in Saudi Arabia, the option of hedging will be less and inline with the local legal system.

The golden rule is "Each project have different variable with different characteristics. The project manager job is to address them, understand them and then chose the most appropriate ones.

Appendix B 4: The transcribe of the interview that had been conducted with *Alan Desira*.

①

- Profile
- No obligation to mention your name

Time : 10:00 am to 11:00 am
Date :
Venue : Carl Tucker - Face to Face
Interviewee :
Interviewer : Mohammad.H.

- Inflation for short term project → manageable
- long project → a bigger problem
- The best company to Shell Two biggest project 2007/2008

Water GTI → price double (they knew it in the middle)
(Saba Sabu Island)

- Inflation
- Fixed Price Contract. you going to pay it any one they done better budget

- if inflation not → stick in design → to save money → you will be late
construction
- the client still stick with it

-
-
- 202 project → less people → Big company can take big projects
- EOR project → did for the project → T2 (small groups will smaller pieces of project)

- splitting the project → more managed flexible

□ IHS CERA → Capital Cost Index (Chart)

2005 → 2008 → inflation doubled.

- Stat bonds (4.57%) → project cost doubled.
- oil industry depends on oil price
- (if to Et.) not in current world
choose the construction → consider inflation in other world³

Appendix B 5: Some of the notes taken from the interview with Carl Tucker, who is currently working as Cost and Estimation manager at Dubai Petroleum Establishment.

Time : 0200pm
 Date :
 Venue : Eugene
 Interviewee :
 Interviewer :

to be shipped outside ← largest developing a gas field (NG) facilitating on shore

Island belongs to Russia phase II

SAKHILIN

- Exxon → Marathon → Shell
- One of the example Sackon (Russia) largest project in the world (1 B\$) → (? 4B\$) → because of many reasons
- If it was over the people investigated why?
- 5% allowance was consulted in the budget
- Exchange rate hit the project → restriction the budget on the country economy went down dollar
- Country Reforms → drilling in certain area
- Building a bridge on a river → should be big
- direct to manufacture → by pass the fabricator
- long term agreement → expensive at the begin → then tax because 50% Cheaper
- Economist working to the project
- Keep basket of currency to avoid the currency change
- labor productivity higher by change the labor and change location
- Welders 3 year contract → good deal at the start → with time
- Inverse against material raise will make the
- Strategy of in price to manage the money difference
- loan to grow same as the raise in inflation (constant value)
- awarded more → bonds → but long term
- JV Pertamina (25% → 70%) (Shell) (Mitsubishi) 50% 50%

sell part of the project if the asset to third party to offset the increase of cost

Appendix B 6: Appendix B 3: Some of the notes taken from the interview with Eugene Flynn, who is currently working as Project Manager at Brownfields LLC.

Time : 0200 – 0245 pm , **Date:**06 July 2010, **Venue:** Meeting Room, **Interviewee:** Eugene – Face to Face
Interviewer : Mohammed H.

Eugene has long experience with many international companies such as Exxon, Shell and Petrofac. He prepared some examples to discuss in the interview. These examples written on a piece of paper brought by him.

He work in the team used to managed the world largest project that called SAKHLIN project. He worked in Phase II of that project. The cost estimation for that project was 11 Billion dollar. However, because many reason, the final cost of the project went up to 24 Billion Dollar. The project consisted of 5 phases and lasted for many years. By the way, SAKHLIN is an island belongs to Russia. It is to the north of JAPAN. The project main objective is to develop a gas field and build LNG facilities (Liquefied Natural Gas). Eugene was a member of the team who investigated why the project cost more than doubled.

It is worth to mentioned that the initial cost estimation done considered a 5% inflation rate. One of the main reason found was the exchange rate. Since the project built in Russia, and from the time the cost estimation was done, the Russian Rubble (Russia Currency) fall down by 20%). Which led to in crease on every thing that is pained by any other currency? The Rubble fall because of the country economy was suffering at that time. Therefore, most of the project requirements from material, equipment or labor became more expensive.

One another factor that found was the country regulations. The country equations tries to benefit from the projects build by foreign companies. The country tries to squeeze as much as they can from the contractor or project owner. Then, any thing need to built has to be approved from the government. For example, the project team planned to build a small bridge to connect between the two banks of a river. The government conditioned given the approval to build the bridge by changing the bridge size to become bigger. As a result, more cost has been added to the project.

One of the techniques that were used to avoid inflation is to contact the manufacturer directly. Fabricator or integrators normally add more cost to the project. Then, the inflation series of impact will take them out of consideration.

Another technique was to sigh a long term contract with the material provider. At the beginning of the contract, the contract is more the market average. But after 5 years, the contract started working to the advantage of the project. Also, longer contract were signed with some labor. At the time the contract signed, the contract was to the advantage of the employee. However, after some times, the contract started working to the advantages of the project.

There are some sort of insurance to insure the increase of a certain materials. Normally, the contract department woks on these things.

A proper money management should be developed to assure cash flow fulfill the projects needs. The type of project fund is defiantly playing a role here. A good strategy need to be developed while considering all the market variables.

Large and international project normally hire economist to do the cost estimation and monitor the inflation or forecast it.

On of the techniques is to have a multi currency budget. This was a recommendation give by the investigation team to avoid the currency exchange rate variation. If one currency increase, the other one will offset it.

Investing the project money in any thing such to offset the inflation and keep the money value constant is a great ideas, however, the project manager need to understand the required cash flow. For example, to get the interest on the bonds, where the project money got temporally invested, should not be sold till the end of the year (Maturity Time). Then, hedging from inflation can be a kind of difficulties to the project.

Working in the form of Joint Venture (JV) is a good way to split the risk along with the profits. One of the partner of the JV can provide the project with cheaper labor. Another on can provide the reject with more cheaper technology. Then, as a team, they can minimize the exposure to inflation and then cost escalation. Some JV used to sell a percentage of the project to a third company to overcome the project expenses. The inflation normally raise the prices of every thing. Even the project asset cost increase. Then selling a percentage of the project can be a valid option.

In some project (Oil and Gas), an early production Facility was build to produce oil even before the platform got built. Then the project can use the revenue from the sold oil to finance the project itself at a very early stage. Buy commodities or materials is a good idea specially if the material cost represent a big portion of the project cost estimation.

Using the forecast developed by some consultancy my be a good option. However, it won't work for smaller projects. Some big company develop their own cost forecast or inflation forecast to guide their project managers in their estimation. Petrofac is one example.

The technology used in the EOR project for Dubai Petroleum changed the economical side of the equation. Instead of injecting CO2 gas, the company decided to inject hydrocarbon gas. In the first case, the breakeven oil prices is 80-90\$. In the second case it is 30-40\$.

You can control inflation and live with it but it can't be prevented. If forecasting the inflation is so accurate, then all companies or projects will do profit. But this is not the case. All economists looking for small, flat and consistent percentage of inflation to manager their business well. Project labor and material can be a very effective decision factors on the success of the project.

Appendix B 7: The transcribe of the interview that had been conducted with Eugene Flynn.

<p>• many projects shelved because of inflation it is a risk</p> <p><u>Reduce cost</u></p> <ul style="list-style-type: none"> • Stop hiring • Reducing Personnel • Watch for contingency costly materials • Structure steel → review consumables • Sub contractor → watch them → additional requirements • don't don't spend more on fancy items <p>Review Scope</p> <ul style="list-style-type: none"> • Logistics → change the way to cheaper • QAQC: do ho <p><u>Engineering</u> exact engineering → less cost</p> <p>pipe sleeve → test → test money</p> <p>→ exact size → exact money</p> <ul style="list-style-type: none"> • do things faster & appropriate → longer • Service agreement → fixed rates time • Cost estimation • financial sites (margin) inflation expectations 	<ul style="list-style-type: none"> • The longer the project → more issues. Weather is a big killer → marine vessel → contracts terms bad weather → move cost → use weather forecast 200,000 \$ → Per day 250,000 \$ 500,000 \$ • Storage more + insurance → timing • depend on insurance policy + ensure clause contract team • Technical insurance → yes 	
	<p>You can control inflation and live with it but it can't be prevented. If forecasting the inflation is so accurate, then all companies or projects will do profit. But this is not the case. All economists looking for small, flat and consistent percentage of inflation to manage their business well. Project labor and material can be a very effective decision factors on the success of the project.</p> <p>In some project (Oil and Gas), an early production Facility was build to produce the money value constant is a great idea, however, the project manager need to understand the required cash flow. For example, to get the interest on the bonds, where the project money got temporarily invested, should not be sold till the end of the year (Maturity Term). Then, hedging from inflation can be a kind of difficulties to the project.</p> <p>The technology used in the EOR project for Dubai Petroleum changed the economical side of the equation. Instead of injecting CO2 gas, the company decided to inject hydrocarbon gas. In the first case, the breakeven oil prices is 80-90\$. In the second case it is 30-40\$.</p> <p>In some project (Oil and Gas), an early production Facility was build to produce the money value constant is a great idea, however, the project manager need to understand the required cash flow. For example, to get the interest on the bonds, where the project money got temporarily invested, should not be sold till the end of the year (Maturity Term). Then, hedging from inflation can be a kind of difficulties to the project.</p>	<p>A proper money management should be developed to assure cash flow fulfill the projects needs. The type of project fund is definitely playing a role here. A good strategy need to be developed while considering all the market variables.</p> <p>Large and international project normally hire economist to do the cost estimation and monitor the inflation or forecast it.</p>

Appendix B 8: Some of the notes taken from the interview with Tony Galustian, who is currently working as Project Manager at Dubai Petroleum Establishment.

Time : 1030 – 1100 am
Date :13 July 2010
Venue : Tony's Room – Face to Face
Interviewee : Tony Galustian
Interviewer : Mohammed H.

Experience

Currently	Project Manager	Dubai Petroleum Establishment	Dubai
3 Years	Sr. Project Engineer	Mac Dermont	Dubai
3 Years	Sr.Project Engineer	Dubai Petroleum Company	Dubai
3years	Sr.Pipe Lione Engineer	Zadco	AbuDhabi
3 Years	Sr.Pipe Engineer	Brown & Routs	
3 Years	Project Engineer	Kverner Oil & Gas	
3 Years	Project Engineer	John Brown	
3 years	Project Engineer	Takneeb	Abu Dhabi

Inflation is a real risk that threaten all projects specially projects with long duration. I know that many projects in the country or in the region got shelved because of the inflation impact on the cost of the project. Once the inflation unpredictably hits, the cost estimated for the work became not sufficient to complete the work.

Reducing Cost

Once the project engineer realized that the cost of the project is overrun because of inflation, the right thing for him to do is to reduce the cost of the project. That can be done bad many means. On of these means is to stop hiring more staff or even reduce the number of the existing employees. Also, The contingency used in the initial cost estimate need to be reviewed. No need for additional materials as a spare which means save some money. Review the required materials by the project may be a good practice. Review the consumables in the projects may be a good thing do save money which will be used later to overcome the inflation. Logistics review can be done on the methods to reduce the cost. Project Manager needs to seek other cheaper alternatives for staff / material alternatives. This works better if the project schedule is not tight.

Weather forecast is a good practice to avoid extra charges of the barges that will be used by the project. Most of the projects that I have worked on are offshore projects. The barge cost is varies from \$20K to \$500K depend on the barge size. Forecast can help plan the barges rent well to avoid bad wither and then extra cost.

Watch & Monitor

Most of the time, Subcontractors suggest new idea to enhance the out come of the project or add extra feature to the final product. The project manager needs to be careful in this regard. No need for additional fancy features.

Review Project Scope

The project manager needs to review the project scope once again. This will help the project manager to reduce the work scope (if he/she can) to afford the money for the major task. Stakeholders need to be part of this review.

QAQC and Engineering

Quality Assurance and Quality Convergence (QAQC). Good QAQC practice helps the project in finding the exact quantity of the materials. This means less cost. For example, to wild two pipe line together, a wilding sleeve is required. The sleeve is expensive. The variable here is the width of the sleeve. With good QAQC and engineering, the exact sleeve width can be determined.

Fixed Price Contract

This type of contract is good for long or even short term projects. One form of this type of contracts is a service agreement with fixed rates.

Cost Estimation:

Normally inflation rate is added to the cost estimation based on the official number given in the media. However, these numbers are not correct. Reliable forecasted inflation rate can be considered if they were taken fro well know sites such as Bloomberg.

Project Duration

The longer the project, the more issue will rise to surface. Some times it is wise to reduce the time that will be taken by a project to the minimum.

Insurance

Haven't heard about any kind of insurance against inflation. However, I know that there are many kind of insurance that protect the projects from the technical failures or staff failures during the project.

Appendix B 9: The transcribe of the interview that had been conducted with Tony Galustian.

Topic	Interviewees				
	Brian/Lee	Alan	Carl	Eugene	Tony
1 Profile	<p>The interviewees variety. From different disciplines (Finance, Oil/Gas, Project cost Consulting & Construction Company).</p> <p>Very good well known of the company locally Internationally</p> <p>Briefly talk about each interviewees</p>	<p>Alan works as an advisor to Royal Bank of Scotland (rbs) who study the stock market and exchange rate changes and inflation and consequences happen based on them.</p> <p>Alan is Head of Corporate Risk Solutions (CRS) in Middle East and North Africa at the Royal Bank of Scotland (RBS) and a senior member of the RBS MEA Management Team. Through his current role, and previously as the Senior Marketer in the UK team, Alan has been responsible for advising and executing risk management solutions for some of the largest global companies, with particular focus on interest rate derivatives, foreign exchange and credit derivative management.</p> <p>Prior to joining RBS in 2007, Alan spent over 10 years at JPMorgan in a variety of risk management and financial market sales roles in their London, New York and European offices.</p> <p>Alan graduated with a BA (Hons) in Industrial Economics at University of Nottingham and is registered with the FSA</p>	<p>move this to project planning</p>	<p>Eugene has long experience with many international companies such as Exxon, Shell and Petrofac. He prepared some examples to discuss in the interview. These examples written on a piece of paper brought by him.</p> <p>He work in the team used to managed the world largest project that called SAKHALIN project. He worked in Phase II of that project. The cost estimation for that project was 11 Billion dollar. However, because many reason, the final cost of the project went up to 24 Billion Dollar.</p> <p>The project consisted of 5 phases and lasted for many years. By the way, SAKHALIN is an island belongs to Russia. It is to the north of JAPAN. The project main objective is to develop a gas field and build LNG facilities (Liquefied Natural Gas). Eugene was a member of the team who investigated why the project cost more than doubled.</p> <p>2.5 Years Senior Project Manager – Sakhalin II Phase 2 (SEIC) Central Engineering Team 1 Year Project Management Consultant – Sakhalin II Phase 2 (SEIC) Cost Recovery Project 2 years Project Manager – Shell Toucan Field development and Rabi field 2 years Project Manager – BP Chirag 1 PREP 2 Project 1 year Project Engineer - Marathon Solstice Project 5 years Lead Mechanical Engineer - ExxonMobil Buckland & Skene Proj</p>	<p>Currently Project Manager Dubai Petroleum Establishment Dubai 3 Years Sr. Project Engineer Mac Dermont Dubai 3 Years Sr. Project Engineer Dubai Petroleum Company Dubai 3 years Sr. Pipe Line Engineer Zaidco Abu Dhabi 3 Years Sr. Pipe Engineer Brown & Routs 3 Years Kverner Oil & Gas 3 Years John Brown 3 years Project Engineer Takneeb Abu Dhabi</p>
2 Project Variables (Planning)	<p>The topic is a complicated topic since many variables are interfering in each other to cause the inflation. The case of having high unpredictable inflation is more noticeable in South America. It should be known that there is no single formula to avoid or protect your self from inflation. Every project has its own characteristics and special conditions that make it different from the other projects. A lot of factors are playing a significant role in affecting the project budget and set the risk exposure limits. Every project manager have to understand the project characteristics very well to decide to which level a risk can be taken and what are the most appropriate mitigation that can be taken</p>	<p>In each project, all the variable in the project need to addressed. These variable varies from variable with the project nature, project financing method, stakeholders objectives and expectations or with the country the project in. The right hedge can be selected after these variables got addressed in the first place.</p> <p>Project manager need to understand the part of the project that will be affected by inflation and work out a risk protect.</p> <p>The golden rule is "Each project have different variable with different characteristics. The project manager job is to address them, understand them and then chose the most appropriate ones.</p>	<p>For the short term projects, inflation can be managed. For long term projects, the problem is bigger. SHELL in 2007 and 2008 had two projects the first one is called Qatar Gas To Liquid (LNG) project and the other one is called SAKHALAIN project in Salin island. In these two project, the final cost became double the allocated budget for the project. Inflation was one of the reasons for that. For project variables need to be studied very well at the initial stages to decide what is the hedge that works well for the project. The inflation world wide need to be consider in all projects.</p>	<p>Do Brian to Alan to Carl agree on the worth of addressing & understanding project variables. Is decide which Hedge will work fine.</p>	<p>Inflation is a real risk that threaten all projects specially projects with long duration. I know that many projects in the country or in the region got shelved because of the inflation impact on the cost of the project. Once the inflation unpredictably hit, the cost estimated for the work became not sufficient to complete the work.</p> <p>move to project planning</p>
3 Project Feasibility (Planning)	<p>Before starting any project, the project manager need to make sure that the project is viable.</p>	<p>Done</p>	<p>of the project risk factor should</p>		
4 Company Strategy in Risk Taking (Planning)	<p>Then, the manager need to decided based on the company corporate strategy and the project management strategy to which level the project can be exposed to a risk such as inflation. Normally, at the time of cost estimation, inflation is considered based on historical data</p>	<p>Should Brian has raised the point to be based on compy strategy</p>			
5 Country Regulations (Planning)		<p>One more thing to consider is the country speciality in terms of politics, religion or maybe location. For example, Saudi Arabia is an Islamic country that prohibited the use of financial derivative. Then, for a project in Saudi Arabia, the option of hedging will be less and in line with the local legal system.</p>		<p>One another factor that found was the country regulations. The country equations tries to benefit from the projects build by foreign companies. The country tries to squeeze as much as they can from the contractor or project owner. Then, any thing need to built has to be approved from the government. For example, the project team planned to build a small bridge to connect between the two banks of a river. The government conditioned given the approval to build the bridge by changing the bridge size to become bigger. As a result, more cost has been added to the project.</p>	<p>o Alan & Eugene emphasis on the similarity to country regulations & speciality. Good understanding of country culture & government procedures can help in better cost estimation & an deciding on best hedge suits the project in that country.</p>
6 Project Size (Planning)		<p>The selection of the hedge need to consider the project liquidity. Some hedges are available in a small amount in the market, for big projects, it maybe difficult to buy the hedges from the market since there will be less hedge contract available.</p>			
7 Cost of Managing Inflation (Planning)		<p>Managing inflation in a project is an additional cost to the project. If the cost of managing inflation is higher compared to the risk of having a fixed price contract and the price goes down, then a fixed price contract is a better choice.</p>			
8 Final Product (Enhance)			<p>Oil and Gas Projects: In Oil and gas projects, the situations is a bit different. The higher the oil price, the higher the project cost. Although the oil price inflated, however, the project still visible to be done. That was because the project product price also increased.</p>		

Appendix B 10: The input from all interviewees are split to match Taylor (2003) risk management stages and methods. For example, all responses given by the interviewees that related to Project's Variables, are arranged to be next to each other. the purpose was to compare between the interviewees opinions and recommendations.

<p>9</p> <p>Planning</p> <p><i>*</i></p>			<p><i>Carl & Tony agr Eugen agrees on the criticality of the project duration & the impact of inflation.</i></p> <p><i>more time → more impact it inflat</i></p> <p><i>the duration need to be shorter as much as they can</i></p>	<p>A proper money management should be developed to ensure cash flow fulfill the projects needs. The type of project fund is definitely playing a role here. A good strategy need to be developed while considering all the market variables.</p> <p>Large and inflation project normally hire economist to do the cost estimation and monitor the inflation or forecast it.</p> <p>Investing the project money in any thing such to offset the inflation and keep the money value constant is a great idea. However, the project manager need to understand the required cash flow. For example, to get the interest on the bonds, where the project money got temporarily invested, should not be sold till the end of the year (Maturity Term). Then, hedging from inflation can be a kind of difficulties to the project.</p> <p>The technology used in the EOR project for Dubai Petroleum changed the economical side of the equation. Instead of injecting CO2 gas, the company decided to inject hydrocarbon gas. In the first case, the breakeven oil prices is 80-90\$. In the second case it is 30-40\$.</p> <p>In some project (Oil and Gas), an early production Facility was build to produce oil even before the platform got built. Then the project can use the revenue from the sold oil to finance the project itself at a very early stage.</p>	<p>Review Project Scope The project manager needs to review the project scope once again. This will help the project manager to reduce the work scope (if he/she can) to afford the money for the major task. Stakeholders need to be part of this review.</p> <p>Project Duration The longer the project, the more issue will rise to surface. Some times it is wise to reduce the time that will be taken by a project to the minimum.</p>
<p>10</p> <p>Coordination with competitors</p> <p><i>(Share)</i></p> <p><i>*</i></p>			<p>Coordinating with other contractor.</p> <p>Some association in the industry aims to coordinate between the contractor so the contractor themselves will not cause the inflation. That can happen if all contractors apply for all projects. Then, companies to compete between them to try to attract the required resources for the expected work. Therefore, the wage of the employees will go higher. These association organize between the contractor to keep the market steady.</p>	<p>Working in the form of Joint Venture (JV) is a good way to split the risk along with the profit. One of the partner of the JV can provide the project with cheaper labor. Another one can provide the project with more cheaper technology. Then, as a team, they can minimize the exposure to inflation and then cost escalation. Some JV used to sell a percentage of the project to a third company to overcome the project expenses. The inflation normally raise the prices of every thing. Even the project asset cost increase. Then selling a percentage of the project can be a valid option.</p>	<p><i>Eugen & Carl talked about international association to organize supply/demand on projects → control prices raise or buy prices.</i></p> <p><i>JV with other companies can provide the labor reduced on cheapest level.</i></p>
<p>11</p> <p>Splitting the Project in smaller work</p> <p><i>(Reduce)</i></p>			<p>Splitting the project into some piece of work:</p> <p>Some big project in Dubai petroleum have been splitted into smaller pieces of work to minimize the risk of depending on one contractor. CO2 for Enhanced Oil Recovery Project (EOR) is an example where the work splitted into ten smaller pieces. If inflation hit a pieces of work, then the consequence will be limited to that work only. Bigger companies can do the bigger projects only. Then, and since there is few big companies in the market, then competition is very limited. The client to depend on a single contractor. Then, splitting the work into smaller piece will allow other companies to participate in the work.</p> <p>The project cost has been splitted into categories. The inflation impact has been anticipated in each category. Then, an average inflation impact has been considered for the whole project. The impact of inflation need to consider the number of years that the project will be built in. The more less the control that the project manager has, the less more the inflation can do.</p>		

Appendix B 11: The summary was reviewed and some notes were written.

12	Project Funding (Planning)	<p>Project fund methods are different. The project fund can be by cash from stakeholders or shareholders, or from a bank as a loan or a loan from a third party. Each method of funding requires the project manager to deal with inflation risk in different way. For example, if the project got funded through a bank, then definitely there will be an interest on the loan. These interest are varying up and down from time to time based on the economy status. The central banks uses the interest rate as a mean to control the inflation in the country by managing the money supply into the economy. Then, as a result, interest rate changes from time to time based on the economy situation.</p> <p>Therefore, if the project manager can manage the interest rate changes, then he can manage the inflation to some extent. It can be understood the inflation is affected by the interest rate. If the same time, the project cost is affected by inflation. Then there is a direct relation between the project cost and the interest rate.</p> <p>Back to the example of having a fund from the bank. The project manager need to look to the problem from two angles. The first one is Asset. The project scope of work determine the right protect for the project. For instance, land price and oil price to decide how to respond to inflation. Form the liability side, the project manager need to consider the project cash flow. If the cost is going up and the revenue is going up as well, then the problem of inflation almost is nothing. On the other hand, if the cost is going up while the revenue is constant, then the problem become more serious. Also, if cost is going up and the revenue will go up after some time, then this is called a time mismatch. In each case different protection need to be considered.</p>	<p>Alan talked about funding sources.</p> <ul style="list-style-type: none"> Asset / Reliability Asset → land oil price Reliability Side → Cash flow 		
13	Specialized Inflation Consultancy (Monitor)		<p>Using the forecast of some specialized consultancy: Some specialized consultancy do a kind of market forecast on inflation and the cost for the projects in next years. One of these consultancy called IHS CERA. They provide their clients with chart showing their prediction on the prices for the coming years. A project manager, instead of doing the forecast by him self, can use these accurate forecast and use them in the cost estimation.</p> <p>IHS (NYSE: IHS) is a leading global source of critical information and insight dedicated to providing the most complete and trusted information and expertise. IHS product and service solutions span four areas of information that encompass the most important concerns facing global business today: Energy, Product Lifecycle, Security, and Environment, all supported by Macroeconomics. By focusing on our customers first, IHS enables innovative and successful decision-making for customers ranging from governments and multinational companies to smaller companies and technical professionals in more than 180 countries. IHS celebrated its 50th anniversary in 2009 and employs approximately 10,000 people.</p> <p>CERA is one brand from IHS IHS Cambridge Energy Research Associates®, Inc. (IHS CER), governments, financial institutions, and technology providers. IHS provides energy market, geopolitics, industry trends, and strategy. CERA future and formulate timely, successful plans in the face of rapid change, independence, fundamental research, foresight, and originality. IHS provides new insights ahead of conventional wisdom, providing a competitive advantage in investment, decision making, and performance.</p>	<p>Carl, from his experience as cost estimator he use some charts or anticipation for how much what are the expected capital cost increase → based on it → do the cost estimation</p> <p>Alan suggests that the project manager or economist need to anticipate the inflation, if they can.</p> <p>Using the forecast developed by some consultancy may be a good option. However, it won't work for smaller projects. Some big company develop their own cost forecast or inflation forecast to guide their project managers in their estimation. Petrofac is one example.</p>	
14	Anticipate Inflation (Planning)	Again, the project manager need to do some research on the future expectation of the prices.	Alan		
15	Cost Estimation (Planning)	Also, cost estimation or budget has a contingency allowance that can vary from 10% to 50%, depend on the company and the project itself.	<p>Consider the inflation in the budget. Considering the risk of inflation at the very beginning: Forecast the possible inflation during the project life time. Then include the inflation effect on the project budget. This is the most common way to live with inflation.</p> <p>The situation in infrastructure project is more difficult. That is because there will be no direct revenue to the client from these project. Then the more the inflation, the harder the situation to continue the project.</p>	It is worth to mentioned that the initial cost estimation done considered a 5% inflation rate. (Sakhalin)	<p>Cost Estimation: Normally inflation rate is added to the cost estimation based on the official number given in the media. However, these numbers are not correct. Reliable forecasted inflation rate can be considered if they were taken from well know sites such as Bloomberg.</p>
<p>o all interview agrees on that inflation consideration on the cost budget is very good practice. Allowance can be kept in the budget for this regarding Media/Consultancy/ self-work anticipation can be used to figure out the inflation %.</p>					

Appendix B 12: In the next stage, the recommended hedges need to be weighted in terms of scores to figure out the most reliable ones and to which stage and methods they belong to.

• Eugene

16	Deal with Manufacturer (Reduce)				One of the techniques that were used to avoid inflation is to contact the manufacturer directly. Fabricator or integrators normally add more cost to the project. Then, the inflation series of impact will take them out of consideration.	
17	Resources Management Reduce Cost (Reduce)	✱		Resources allocation and management For bigger projects or international projects, a wider view need to be done to cover some other countries as well. Inflation never the same in two countries. For example, it is between 2 to 5 in Europe and between 10 to 15 in the Arabian gulf. The project manager need to be wise in selecting the companies based on their countries economics. For example, the project manager can do the engineering work 1 countries (or companies) where the wage inflation is very minimal like India or Pakistan. At the same time, can build the equipment using contractors where they will be boiling the equipment in countries that have a stable prices increase in materials. And so on. For SaTian project, the engineering and the actual build of the equipment was done in Korea and the material brought from UK.	<ul style="list-style-type: none"> • Carl talks about resume planning stage • Tony talks about cost reduction after inflation escalating the cost. • Tony says QAQC & Engineering is an indirect method to avoid inflation. 	<p>Reducing Cost</p> <p>Once the project engineer realized that the cost of the project is overrun because of inflation, the right thing for him to do is to reduce the cost of the project. That can be done in many means. One of these means is to stop hiring more staff or even reduce the number of the existing employees. Also, the contingency used in the initial cost estimate need to be reviewed. No need for additional materials as a spare which means save some money. Review the required materials by the project may be a good practice. Review the consumables in the projects may be a good thing to do save money which will be used later to overcome the inflation. Logistics review can be done on the methods to reduce the cost. Project Manager needs to seek other cheaper alternatives for staff / material alternatives. This works better if the project schedule is not tight. Weather forecast is a good practice to avoid extra charges of the barges that will be used by the project. Most of the projects that I have worked on are offshore projects. The barge cost is varies from \$20K to \$500K depend on the barge &</p> <p>QAQC and Engineering Quality Assurance and Quality Convergence (QAQC). Good QAQC practice helps the project in finding the exact quantity of the materials. This means less cost. For example, to weld two pipe line together, a welding sleeve is required. The sleeve is expensive. The variable here is the width of the sleeve. With good QAQC and engineering, the exact sleeve width can be determined.</p>
18	Fixed Priced Contract (Transfer)	✱✱	One of the ways that are commonly used is the fixed price contract.	Fixed Price Contract: I can't think of as a way of hedging from inflation. The client will pay for the inflation any way in different ways. The inflation consideration will be there in the bid price for the contract. Also, if the inflating hit strongly, the contractor will try his best to save money here and their to minimize his loss. The contractor will try to reduce the scope of work, reduce the engineering work and the construction work. Therefore, lower quality and longer time to achieve the project goals. The client will not be isolated from the contractor. A failure of a contractor will lead to a failure of the client.	<ul style="list-style-type: none"> • Brian / Alan / Eugene / Tony all agree on fixed price contract. 	Fixed Price Contract This type of contract is good for long or even short term projects. One form of this type of contracts is a service agreement with fixed rates.
19	Long term contract (Transfer)	✱✱	Another way to hedge from inflation is the having long term agreement with the supplier at a predefined prices. This agreement can be indexed to inflation as well.	Long term contract Big organization such as Shell has a long term contract with the contractors working to it. Thus, the contractor will guarantee some work in the future and the clients (Shell) will assure an acceptable increase in the services charges). Also, some contractors working to the same client can establish a joint venture to split the profit while not competing on each project.	Another technique was to sign a long term contract with the material provider. At the beginning of the contract, the contract is more the market average. But after 5 years, the contract started working to the advantage of the project. Also, longer contract were signed with some labor. At the time the contract signed, to contract was to the advantage of the employee. However, after some times, the contract started working to the advantages of the project.	<ul style="list-style-type: none"> • Brian's long term contract is a good solution as seen by Brian, Eugene, Carl
20	US Bond (Reduce)	✱	For example, investing the project budget in US bonds to hedge against inflation may be a good idea to some projects but not all. To some projects, having the budget cash available on demand is much important to hedge from inflation.	US Bonds: US bond give annual revenues approximately 6 to 7%. However, the capital cost project index from CERA has doubled from 2005 to 2007. Bonds can reduce the effect of inflation but is not a good hedge as well.		
21	Interest Rate Swap (Reduce)		option gives the borrower to make the variable interest rate a fixed interest rate. Therefore, the risk changing interest rate will be avoided. If the bank think that the interest rate will be 0.5% for this year, 1% in the next year, 2% in the following year, then the bank gave the option to the client to pay the bank a fixed rate of 1% every year and the bank will make the difference to the lender. (if the lender is not the same bank).	<ul style="list-style-type: none"> • Alan doesn't (IRS) for variable interest loan. 		
22	Credit Default Swap (CDS) (Reduce)		Another kind of hedges is called Credit Default swap (CDS). hedge is a kind of insurance that protect the loan from the risk of getting the client bankrupted. For example, if a project is, for some how, a single client. Then, if the client bankrupted, then the project will be affected negatively.	CDS as well.		
23	Interest Rate CAP		Another option is called interest rate CAP. This option assure that the interest rate on a loan will not go above a certain level.			

• Brian

Appendix B 13: The hedges that have been recommended by the interviewees are classified in terms of levels. Level four hedges are the hedges that been recommended by four or more interviewees. This level is the most reliable hedges named by the interviewees

24	Commodities (Rahic)	Another technique to hedge is the commodities. It is matter of fact that the more the inflation, the more the prices of commodities. If for example the project intend to buy a new drilling rig and because of inflation the steel price went up. Then the drilling rig went up as a result. Then, there will be a problem in the project capital expenditure. The oil prices have to be above a certain price to be in the safe side. Then, the project the manager can buy a commodities options from the stock market (a kind of derivative) which will give the project the option to buy the steel at a predefined price. Call option gives the a hedge from steel price changes if the prices is expected to rise. Put option is a hedge from steel prices changes if it is anticipated that the price will go down.	Commodities: Commodities can be good hedge. Buying the materials, equipment up front may be a good choice if the expectation is to have the more prices in the next years. For example, for Jafila project, the martial have been bought up front to be in the save side from price increase. However, this is a risky technique. The project scope of work can be changed any time before the actual implementation. The, the materials to be used or their quantities can be reviewed. This think is very rare to see in today's project. The project manager need to study the benefit of buying the commodities upfront with the opportunity if the money put in a bank with some interest.	Buy commodities or materials is a good idea specially if the material cost represent a big portion of the project cost estimation.	
25	Insurance (Tran)		Insurance: I have never seen a project got insured. Which make since the project value specially in oil and gas industry are very large. Then the client need to pay a premium of minimum 2% to the insurance company. Which means less capital for the projects them selves. BP for example has its own insurance system. The system has a budget for emergency. So they do a kind of self insurance.	There are some sort of insurance to insure the increase of a certain materials. Normally, the contract department works on these things.	Insurance Haven't heard about any kind of insurance against inflation. However, I know that there are many kind of insurance that protect the projects from the technical failures or staff failures during the project.
28	Exchange Rate (Rahic)			One of the main reason found was the exchange rate. Since the project built in Russia, and from the time the cost estimation was done, the Russian Rubble (Russia Currency) fall down by 20%. Which led to in crease on every thing that is paid by any other currency. The Rubble fall because of the country economy was suffering at that time. Therefore, most of the project requirements from material, equipment or labor became more expensive. On of the techniques is to have a multi currency budget. This was a recommendation give by the investigation team to avoid the currency exchange rate variation. If one currency increase, the other one will offset it.	
27	Partial Hedging (Rahic)	The project manager can hedge a part of the project if he thinks that this part of the project will be affected by inflation. For example, it was found that, from a research, a variable X is correlated to inflation by 90% of the times, however, variable Y is correlated by 20% to inflation. Then it is better of the project manager to focus on variable X and hedge against the price change of variable X.			
28	Ignoring Inflation (Accept)		Ignoring the inflation: Ignoring the inflation is not a good choice. Some times, manamegent ignore the inflation impact on the project to show the required budget in a lower figure. Then, get the approval from the senior management.		
29	Monitoring (Tran)		Monitoring the inflation: Monitoring the inflation during the project life time is very helpful. It will warn the project manager from an expected price change that never been considered in the budget estimation. Also, it can reduce the money allocated for the project is the anticipated inflation is going down.		Watch & Monitor Most of the time, Subcontractors suggest new idea to enhance the out come of the project or add extra feature to the final product. The project manager needs to be careful in this regard. No need for additional fancy features.
30	Notes	South America Countries are a very good place to search for examples.		You can control inflation and live with it but it can't be prevented. If forecasting the inflation is so accurate, then all companies or projects will do profit. But this is not the case. All economists looking for small, flat and consistent percentage of inflation to manager their business well. Project labor and material can be a very effective decision factors on the success of the project.	

Appendix B 14: . Level Three and Level Two and Level One hedges are the hedges tat been recommended by three or two or one interviewees respectively.

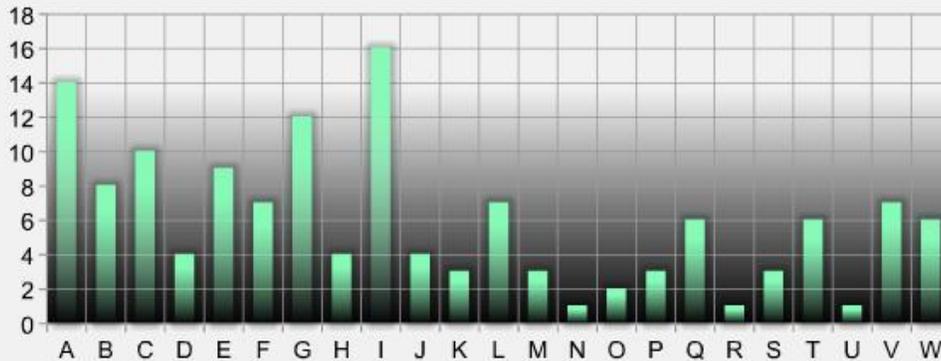
Appendix C: Validation Survey Appendix

1. Understanding Project Variables to avoid inflation risk		10.6	16
2. Project Visibility: Make sure that the project is visible		6.0	9
3. Company Strategy in Risk Management to be considered in planning stage		7.3	11
4. Understanding Country Regulations can reduce the possibility of having cost escalation because of inflation		3.3	5
5. Cost of Managing Inflation is considered at the planning stage		6.6	10
6. Considering the type of project funding (Bank/Shareholders/Cash/Loan)		5.3	8
7. Proper cost estimation can reduce the impact of inflation of project		9.3	14
8. Interest Rate CAP (a Financial Derivative)		2.6	4
9. Fixed Priced Contract is a good protection against inflation risk		11.3	17
10. Long term contract is a good protection		2.6	4
11. Project Insurance against inflation impacts worked in my projects to some level.		2.0	3
12. Dealing with the manufacturer/supplier directly is a good tool		5.3	8
13. Using US Bond to offset the inflation risk on project cost		2.0	3
14. Interest Rate Swap (an Financial Derivative) is a good tool		1.3	2
15. Credit Default swap (CDS) (an Financial Derivative) is a good tool		1.3	2
16. Investing in Commodities (Oil, Gas, Gold, Silver, Land...etc) helps in reducing inflation impact		2.0	3
17. Currency Exchange Rate impact is considered in some stages of the project		4.0	6
18. Partial hedging from inflation is a good solution instead of full project hedging		1.3	2
19. Coordination with competitors has reduced the risk of inflation on my project		2.0	3
20. Final Product Specialty: the price of the product benefit from the increased inflation rate		4.0	6
21. Ignoring inflation is a good response to inflation in some projects		0.7	1
22. Consult with Specialized Costing Consultancy to be aware of any changes on the anticipated inflation rate		4.6	7
23. Inflation Tracking during the project life time is a good tool to reduce the inflation impact		4.6	7

Appendix C 1: The questions of the Validation survey with the number for votes of each question. It is worth to reiterating that the questions are typically based on the hedges recommended by the interviewees.

Question 1

Which of the following tools/protections you have considered to avoid inflation risk or reduce the impact of inflation on your project ?



- A) 1. Understanding Project Variables to avoid inflation risk
- B) 2. Project Visibility: Make sure that the project is visible
- C) 3. Company Strategy in Risk Management to be considered in planning stage
- D) 4. Understanding Country Regulations can reduce the possibility of having cost escalation because of inflation
- E) 5. Cost of Managing Inflation is considered at the planning stage
- F) 6. Considering the type of project funding (Bank/Shareholders/Cash/Loan)
- G) 7. Proper cost estimation can reduce the impact of inflation of project
- H) 8. Interest Rate CAP (a Financial Derivative)
- I) 9. Fixed Priced Contract is a good protection against inflation risk
- J) 10. Long term contract is a good protection
- K) 11. Project Insurance against inflation impacts worked in my projects to some level.
- L) 12. Dealing with the manufacturer/supplier directly is a good tool
- M) 13. Using US Bond to offset the inflation risk on project cost
- N) 14. Interest Rate Swap (an Financial Derivative) is a good tool
- O) 15. Credit Default swap (CDS) (an Financial Derivative) is a good tool
- P) 16. Investing in Commodities (Oil, Gas, Gold, Silver, Land... etc) helps in reducing inflation impact
- Q) 17. Currency Exchange Rate impact is considered in some stages of the project
- R) 18. Partial hedging from inflation is a good solution instead of full project hedging
- S) 19. Coordination with competitors has reduced the risk of inflation on my project
- T) 20. Final Product Specialty: the price of the product benefit from the increased inflation rate
- U) 21. Ignoring inflation is a good response to inflation in some projects
- V) 22. Consult with Specialized Costing Consultancy to be aware of any changes on the anticipated inflation rate
- W) 23. Inflation Tracking during the project life time is a good tool to reduce the inflation impact

Appendix C 2: The result of the Validation survey is presented in the form of a bar chart. The most preferred hedge by the surveyees is the Fixed Price Contract which belongs to the Transfer risk management method

My Surveys

 CREATE A NEW SURVEY

 CREATE A NEW QUIZ

Account Type: Free!

Status	Title	Date Created	Responses	Options
Survey Active	Protections From Inflation	8/17/2010	26	Results Edit Copy Launch Clear Delete

Appendix C 3: A website called FreeOnlineSurveys.com was used to conduct the survey. The control consul from this website is user friendly and can save the survey questions and results for many years.



1. Design 2. Settings 3. Launch

Launching your survey

Congratulations the survey is now ready to be launched!

Just decide from the options below how you want to distribute this survey.

- 1. [Create a link you can e-mail](#) - This is the simplest option, we will provide you with a link to your survey which you can send to each participant in an e-mail.
- 2. [Create a link for your web site](#) - Use this if you would like to include a popup survey on your own web site.
- 3. [Send the survey to your e-mail list](#) - (Survey Extra subscribers only) Save time and trouble by letting us e-mail a link to this survey to your list of participants.

Note: All surveys are anonymous unless you have requested personal details from the respondent in one of your questions.

Appendix C 4: The free website gives the user the option to send the survey as a link to the required people. The link can be pasted in an email and sent easily to all precipitants.

