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THE IMPACT OF INDUSTRIAL ACCIDENT ANNOUNCEMENTS ON FIRMS' STOCK PERFORMANCE

AN EMPIRICAL INVESTIGATION INTO MARKET REACTION IN CHINA

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Abstract
This paper critically gazes into the content of 204 industrial accidents announcements in China and estimated the impact of industrial accident content on firms' abnormal return performance. Generally, the market was selective in reacting to the content of the industrial accident announcements. Statistically, the abnormal returns remained significantly positive for the two day event when no death, no injuries, 1-4 death and 1-4 injury rate, no cut/break, half a day cut/break in production and natural industrial accident were announced. However, the market reacted negatively to man-made industrial accident announcements. In addition, there were negative significance abnormal returns when higher rate of death, injury rates and days cut production were reported. The announcement of the cause and the type of industrial accidents revealed insignificant negative reaction from the market. The abnormal returns accumulated negatively for more than 30 days after the industrial accidents announcement.

Keywords: Industries, accident, abnormal, returns, stock, announcement

INTRODUCTION

Industrial accidents are inevitable in the global industrial areas. The frequency of industrial accidents has raised new questions about whether the industrialized countries can maintain its industrial pace of expansion without doing catastrophic harm to its people and the environment. The most obvious consequences of an accident include loss of revenue, inventory, raw materials and finished products, damage to fixed assets, business interruption and human resources. For instance, due to a fire accident in 2000, Ericsson loss was estimated to reach US $400 million for its T28 model (Norrman and Jansson, 2004). When industrial accidents occur, stakeholder and investors of most firms update their policies about the safety of that particular plant or of the entire firm (Elliott et al., 2004). The decision of stakeholder is mostly based on information in the financial market, relates to a particular aspect of corporate behavior, such as accident management which reflects on how market analysts assess the financial impact of a company's performance on that aspect. The information content in an industrial accident announcement varies. Earlier research studied the impact of the contents such dividend and earnings, mergers and acquisitions on stock return performance have been studied (Ahanory & Swary, 1980; Asquith & Mullins, 1983; Charest, 1978; Odabasi, 1998). However, the impact of the contents of an industrial accident announcement is still under scrutiny. Even though economic losses in the stock -market around the globe of some selected single man-made accidents has been estimated (Thiengtham & Walker, 2005; Chance & Ferris, 1987; Capelle-Blancard & Laguna, 2010; Burgherr, & Hirschberg, 2008).

Arguably, Chinas' industrial growth rate outshines the industrial growth of any other country and range as one of the top accident prone areas in the world. However, the impact of the content of in an industrial accident announcement on stock performance in China is rare in literature. Thus, this research moves a step to empirically investigate the economic consequences of the content of industrial accident announcement from an investor's point of view on stock performance by measuring the stock abnormal returns. We examine the market reaction to man made category of industrial accidents (such as oil spills, explosion, fires, mine collapses) which comes about due to man ignorance of which firms can prevent if they put their safety mechanism in place and natural accidents (such as floods, earthquake and typhoon). In addition, this research looks into the type of industry involved in the accidents (such as chemical, real estate, mechanic, information technology, agriculture and mining industries), as well as looking into the contents of the announcements such as days cut in production, deaths and injury rates and their impact on the stock market returns.

The specific questions this research tries to address are as follows: What are the losses incurred in the stock market by shareholders when industrial accidents announcements are made? Do such losses vary according to the type of accident and the type of the firm involved? What are the reactions of the market when the contents of the announcement contain variables such as days cut production, the number of deaths, the number of injuries and the cause of the accident?

Corporate managers, risk managers, government regulators and the shareholders in China just as any part of the world are extremely interested in understanding the relationship between industrial accidents and firm's financial performance. Hence, by revealing the relationship and consequences of industrial accident announcements on firm's financial performance, this research will empirically aid in critical managerial decision on implementing safety mechanism and accident preventing measures. Also, the issues addressed in this research will help managers to understand the shareholders' reaction based on the sector of industry affected by the accident. The results of this research could aid shareholders to decide where to invest and helps government risk regulators to access and outline effective policies on industrial risk management.

The rest of this paper is organized as follows, section 2 reviews the literature. The sample, data collection approaches are addressed in section 3. The results of the study are presented in section 4. Section 5 discusses the findings and managerial implications. Finally, section 6 concludes the study and highlight future research.

LITERATURE REVIEW AND HYPOTHESES

In capital markets, investors have access to several information about quoted firms which generates expectation concerning risk and earnings. In efficient markets, stock prices should reflect all of the relevant information about the firms. Event researches have been widely studied, arguably most past studies of the financial impact of disasters have tended to concentrate on natural events, (Miller, 1991; Shelor et al., 1992, Lamb, 1995; West, 2003) which continue to cause severe and increasing damage to global economies and disruption to international financial activity (FEMA, 2003; EMA, 2003). Industrial accidents caused by ignorance of man (man-made) have the potential to bring about catastrophic financial shocks. Industrial disasters and catastrophes of unintended human origin have shown themselves just as capable of seriously disrupting financial systems. Chance & Ferris (1987) studied on the stock price reaction of airlines and airplane manufacturers following an airplane crash using a sample of 46 aviation accidents. They observed a significant price reaction for airlines, but not for airplane manufacturers on the day of the crash. Similarly, Davidson et al. (1987) employed a

sample of 57 crashes over the period 1965 - 1984. They observed a significant price decline for airlines on the day of the crash. In their sample, the negative returns are reversed in the days following the crash. By examining a sample of oil spill, gas leak and other incidental pollution over the period 1985-1991, Klassen & MacLaughin (1996) found a significant abnormal return loss of 1.5% on average. The most important petrochemical accidents for publicly traded companies are the Bhopal chemical explosion on December 4, 1984 in India and the Exxon-Valdez oil spill on March 24, 1989. Capelle-Blancard & Laguna (2010) studied on how the stock market responds to petrochemical disasters and revealed that, on average, shareholders suffer a significant loss over the two days immediately following disasters. Also, they found out that, the losses in the first days are strongly related to the seriousness of the accident. Even though almost all the earlier research findings on the different accident types and different causes in diverse industries resulted in negative abnormal returns. White (1996) studies the Exxon-Valdez oil spill. Surprisingly, abnormal returns are not significant the first four days. But Exxon shareholders incur a cumulative abnormal return of -19% for the first 120 days following the accident. According to Marcus & Goodman (1991), accidents can be quite diverse and to a certain extent, they do share a number of common characteristics (such as complexity). In the cases of complex accidents, the greater the complexity of an accident, the greater the plausible deniability the firm has and the greater the benefit of the doubt the firm involved. Thus, we propose the following hypothesis.

Hypothesis 1 *The stock market reacts (1a) negatively to the types of accident (1b) The stock market reacts differently to the type of industries involved in the accident (1c) The stock market reacts differently on causes of industrial accident.*

According to Chen & Siems (2002) catastrophic events such as industrial accidents can adversely affect both domestic and international capital markets through the creation of uncertainty and panic, the promotion of extreme price volatility and the partial destruction of global financial centers. The most significant consequence of occupational accidents is that the employee loses his or her life. Nevertheless, even if industrial accidents do not result in death, but injury, the employees may face serious health issues. The potential that accidents have to cause damage to human life can be vividly illustrated by reference to the 1984 Bhopal chemical leak and the 1989 Exxon Valdez oil spill. In the Bhopal case, over 2,500 people died, and over 200,000 were injured (Browning, 1993). The most valuable resource any organization has is its employees (Evans & Lindsay, 1996; Simerly, 1997). Human resource activities are mostly accepted to play a central role in connecting employee capabilities with the performance requirements of firms (Youndth et al., 1996). Ayse (2010) concluded in his studies that, human

resource management is also found to be positively related to manufacturing performance. This result is similar to the research results of Challis et al. (2005) which indicated that organizational and human resource practices also explain significant additional variance in both employee and manufacturing performance. Human resource management factors are strongly related to their respective manufacturing performance dimensions and also have a significant effect on financial performance (Jayaram et al., 1999; Ayse, 2010; Ahmad & Schroeder, 2003). Industrial accidents causing devastation to human resource has been reported by many researchers (Browning, 1993; Shrivastava et al., 1988). Fatality or injuries in industrial accident are crucial to shareholders; the results of the analysis of Barrett et al. (1987) selected some commercial airline crashes around the globe and indicate that the immediate negative reaction to fatal airline crashes is significant for only one full trading day after the event occurs. Lamb, R. (1995) indicated that accidents that led to more than 50 injuries caused a significantly larger stock price decline than those with less than 50 injuries. We therefore argue that;

Hypothesis 2. *The stock market reacts differently to death and injury rates in an industrial accident announcement in china.*

Industrial accidents are likely to affect firms' revenues by disrupting their production process. According to Süleyman & Seçkin (2009) industrial accidents also cause losses of products. These losses are likely to affect firms' revenues by disrupting their production process. The repairing and reorganizing efforts constitute the other losses. The costs generated by industrial accidents may differ in terms of the employer or the firm due to the business sector or the peculiarity of the incident (Swamidass & Newell, 1987; Kim & Arnold, 1993). Roth & Miller (1990) found that business performance is affected not only by successful implementation of manufacturing strategy, but also by many other factors, such as environment, general management strength, and other functional strategies. Kim & Arnold (1993) found that return on assets and profit ratios have a statistical significant relationship with manufacturing competence. Their results show that different performance measures, such as return on assets, growth rate and market share may be differently affected by manufacturing competence. Similarly, Wang (1993) showed manufacturing performance has statistically significant effect on financial performance. It is obvious that improvements in manufacturing performance result in improvements in the financial performance of a firm. Thus, we argued that,

Hypotheses 3. *The stock market reacts negatively to cuts in production.*

METHODOLGY

Sample and data description

A preliminary set of keywords is defined first to collect a small set of industrial accidents announcements from different publications dates in the Shanghai and Shenzhen stock markets. These announcements were scrutinized to identify additional phrases and words that are commonly used in announcements of industrial accidents or disasters. Our search covers the keywords mostly used in industrial accidents announcements, headlines and lead paragraphs of announcements circulated in the Shanghai and Shenzhen stock markets in China during the period 2008 –2011. The data source and the keywords we used are presented in Table 1.

Table 1 Keywords and data source

Tab1 A: Keywords used in search for announcements
Accident or accidents or accidentally or disaster or disasters or calamity or calamities or catastrophe or tragedy or tragic or casualty or casualties or misfortune or death or fire or fires or spill or spills blast or blasted or blasts or blasted or leak or leakage or bust or busted or crash or crashed or collapsed or explode or explosion or exploded
Tab 1B: Data source: University of Electronic Science and Technology of China Financial Database. www.Resset.cn

The samples industries involved in the accident have been described in Table 2. The sample consists of 204 industrial accident announcements involving 144 man-made and 60 natural industrial accidents announcements. To ascertain the impact of type accident on the stock performance, the man-made industrial accidents and natural accidents were sub-categorized for analysis. The words in industrial announcements contents such as the type of industry involved, the number of injuries involved, the number of deaths involved and the number of days firms cut of production were sub-categorized and measured to evaluate their impact on stock performance.

Analytical Model

The Brown & Warner (1985)'s methodology to estimate the market reaction to the announcements was adapted. This methodology offers an approach to estimate market returns associated with specific events, while controlling for market-wide influences on stock prices. The ''adjusted'' or ''abnormal'' returns provide an estimate of the percentage change in stock price associated with an event. The underpinning of event study methodology is that in an efficient market, the wealth impact of an event will be reflected immediately in the stock price.

Thus, a measure of such impact can be obtained by observing stock prices over a relatively short interval of time. The first step in executing an event study is determining the event period - the period over which to estimate abnormal returns. Consistent with most event studies, we use a two-day event period consisting of the day of the announcement and the preceding trading day. To translate calendar days into event days, we designate the announcement publication day as Day 0. If the announcement is made on either a non-trading day or after the close of the trading day, the subsequent trading day is treated as Day 0. We measure all other trading days relative to Day 0. Thus, the trading day immediately preceding the announcement day is a Day -1, while that immediately following the announcement day is day 1. Consistent with most event studies, we use the ‘‘market model’’ to estimate abnormal returns. This model posits a linear relationship between the return on a stock and the market return (i.e., the return on the market portfolio) over a given time period as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} is the return of stock i on Day t, R_{mt} is the market return on Day t, α_i is the intercept of the relationship for stock i, β_i is the slope of the relationship for stock i with respect to the market return, and ε_{it} is the error term for stock i on Day t. The term $\beta_i R_{mt}$ is the portion of stock $i's$ return attributable to market movements. The error term ε_{it} is the portion of the return that cannot be explained by market movements and therefore captures the effect of firm-specific information. To compute the expected return for each sample firm, we estimate $\hat{\alpha}_i, \hat{\beta}_i$, and $\hat{S}^2\varepsilon_i$ (the variance of the error term ε_{it}) using ordinary least squares regression (Eq. (1) over the estimation period of 200 trading days. We begin the estimation period from Day -210 and end it on Day -11. We end the estimation period two weeks (10 trading days) prior to the event day in order to shield the estimates from the effect of the announcement and to ensure that any changes in the estimates are not an issue. In some cases, a firm may not have complete data over the estimation period; we require that a firm must have a minimum of 40 stock returns during the 200-day period for us to estimate Eq. (1).

The abnormal return A_{it} for firm i on Day t is computed as the difference between the actual (R_{it}) and the expected return $(\hat{\alpha}_i + \hat{\beta}_i R_{mt})$:

$$A_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt})$$

The mean abnormal return for Day t is given by:

$$\bar{A}_t = \sum_{i=1}^{N} \frac{A_{it}}{N} \quad (2)$$

where *N* is the number of announcements in the sample. To test the statistical significance of the mean abnormal return in Eq. (2), each abnormal return A_{it} is divided by its estimated standard deviation $\hat{S}_{\varepsilon i}$ to yield a standardized abnormal return.

Since the abnormal returns are assumed to be independent across firms, with mean 0 and variance $\hat{S}^2\varepsilon_i$, we know from the Central Limit Theorem that the sum of the *N* standardized abnormal returns is approximately normal with mean 0 and variance *N*.

Thus, the test statistic TS_t for Day *t* is calculated as:

$$TS_t = \sum_{i=1}^{N} \frac{A_{it}/\hat{S}_{\epsilon i}}{\sqrt{N}}$$

We use a *t*-test to determine the statistical significance of the mean abnormal return. The cumulative abnormal return (CAR) for a given time period $[t_1, t_2]$ is:

$$CAR[t_1, t_2\ ] = \sum_{t=t_1}^{t_2} \bar{A}_t$$

ANALYSIS RESULTS

Effect of Industrial Accident on Stock Performance

To evaluate the market reaction surrounding industrial accidents, we analysed the market reaction for the day preceding the announcement (Day-1), the day of the announcement (Day 0) and the two-day event period (Day -1 and Day 0). Generally, negative abnormal returns were for Day -1 (-0.08%), day 0 (-0.25%) and the two-day event period (-0.33%). The analysis revealed significant differences (p<0.05) in mean abnormal returns for the day of the announcement (Day 0) and the two-day event period (Day -1 and Day 0) respectively. The analysis of median abnormal returns of the event period showed statistically insignificant differences (Table 2).

Table 2 Event period abnormal returns for industrial accident announcement

	Day -1	Day 0	Days –1 and 0
Mean abnormal returns	-0.08%	0.25%	-0.33
t- statistic	0.42	-1.04**	-1.23**
Median abnormal returns	-0.02%	-0.08%	-0.04
t- statistic	-0.89	-0.11	0.21

*p<0.10; **p<0.05;***p<0.01

Contents of announcement and their influence on the stock performance

Type of accident and its effect on the stock performance

About seventy percent (71%) and thirty percent (30%) of industrial accidents within the period of this research occurred by man-made and natural means, respectively (Table 3). The market reacted differently on the type of industrial accident for the two day event periods. Negative abnormal a return was recorded in man-made industrial accident announcements (-0.10%)

whereas positive returns were seen in natural industrial announcements (0.06%). However, the analysis revealed insignificantly different (p > 0.05) among the type of industrial accidents announced on firms' abnormal return performance (Table 3).

Table 3 Event period abnormal returns for man-made and natural industrial accident announcements

Accident Type	Number	Mean abnormal Returns	t-statistics	Median abnormal returns	t-statistics
Man-made	144	-0.10%	-0.03	0.02%	1.02
Natural	60	0.06%	0.02	0.03%	0.03

*p<0.10; **p<0.05;***p<0.01

Causes of industrial accidents and its effect on the stock performance

Accidents caused by fire accounted for 21.6% of the total accidents follow by accidents caused by a chemical explosion (19.6%). Oil/gas spill, flood, earthquake mechanical problem, mine collapse and typhoon accounted 16.7%, 12.7%, 12.3%, 7.4% and 3.9 % respectably (Table 4). Accidents caused as a result of flooding (-0.36%), fire (-0.27%), earthquake (-0.25%), typhoon, oil spill (-0.16%), chemical explosion (-0.15%), mind collapse (-0.13%) and mechanical problem (-0.11%) brought about negative abnormal returns. However, the reaction of the market insignificantly (p>0.05) affected the performance of firms' abnormal returns (Table 4).

Table 4 Event period abnormal returns for causes of industrial accident in industrial accidents announcement

Causes of Industrial Accident	Number	Mean abnormal Returns	t-statistics	Median abnormal returns	t-statistics
Fire	44	-0.27%	-0.19	-0.06%	-0.01
Chemical explosion	40	-0.15%	-0.12	-0.04%	-0.52
Oil spill	34	-0.16%	0.12	0.04%	-0.76
Mechanical problem	15	-0.11%	1.21	-0.06%	-0.83
Mine Collapse	12	-0.13%	-0.11	-0.04%	-0.78
Earthquake					
Flooding	25	-0.25%	-0.10	-0.02%	-0.10
Typhoon	26	-0.36%	-1.10	-0.02%	-0.23
	8	-0.21%	-0.13	-0.09%	-0.02

*p<0.10; **p<0.05;***p<0.01

Effect of industry type in industrial accident announcements on stock performance

The chemical industry recorded the highest accidents (44.6%) within the research period. Mining, Mechanical and Real estate industries accounted for 15%, 14.7% and 7.8% accidents respectively. Agricultural and IT industries recorded 8.8% of accidents each within the period of studies (Table 5). The market reacts differently to the type of industry involved in an accident. Real estate (-0.35%), Chemical (-0.27%), Mining (-0.30%), Information Technology (-0.35%) and Mechanical (-0.26%), industries recorded negative abnormal returns. However, positive abnormal returns were observed in industrial accidents in agricultural (0.18%) industry. Notwithstanding, the reaction of the market brought indicated insignificant difference ($p>0.05$) among the types of industries (Table 5).

Table 5 Event period abnormal returns for types of industry in industrial accident announcement

Industrial Type	Number	Mean abnormal Returns	t-statistics	Median abnormal returns	t-statistics
Chemical	91	-0.11%	- 0.16	-0.03%	-1.23
Mining	31	-0.30%	-0.28	-0.02%	-0.83
Mechanical	30	-0.26%	-1.27	-0.18%	-0.61
Real Estate	16	-0.35%	-1.27	-0.12%	-0.64
Agricultural	18	0.18%	0.06	0.04%	0.53
IT	18	-0.35%	-0.27	-0.30%	-0.34

*p<0.10; **p<0.05;***p<0.01

The effect of injuries in industrial accident announcements on stock performance

More than half of the industrial accidents were injury free (78.4%). Out of the 21.6% of injury that occurred in industrial accidents, 11.3%, 4.9% and 5.4% reported less than 5, 8 and more than 8 injuries respectively (Table 6). The market reaction for the two day shown declining trend in abnormal returns as the number of injuries increases. The abnormal returns remained positive and significant in the two day event period for industrial accidents that recorded no injuries and 1-4 injuries respectively.

However, the market reaction brought about negative and significant ($p<0.05$) abnormal returns for the two day event when accidents the recorded 5-8 injuries (-0.19%) and more than 8 injuries (-0.21%) were announced (Table 6).

Table 6 Event period abnormal returns for injury rate in industrial accident announcement

Injury rate	Number	Mean abnormal Returns	t-statistics	Median abnormal returns	t-statistics
No injuries	160	0.09%	1.56**	0.02%	0.12
1-4 injuries	23	0.25%	1.23	0.03%	0.09
5-8 injuries	10	-0.19%	-2.43**	-0.01%	-0.21
>8 injuries	11	-0.21%	-2.27**	-0.01%	-0.23

*p<0.10; **p<0.05;***p<0.01

Death in industrial accident announcements and its effect on stock performance

One of the elements in industrial accident announcements that the public is much concerned of is the fatality and its rate. Almost half (49.5%) of the industrial accident recorded no death. The highest (24.0%) death rate announced ranges between 1- 4 deaths, whiles 16.2% and 10.3% accounted for 5-8 death and more the 8 death respectively (Table 7). Shareholders had diverse reactions to the announcement of the rate of death in industrial accidents. The reaction varies from gains in abnormal returns to lost in returns. Industrial accidents that reported no death (0.05%) and 1-4 death (0.13%) recorded positive abnormal returns respectively. Negative abnormal was revealed in an industrial accident announcement, which disclose 5-8 deaths (-0.15%) and more than 8 death (-0.21%). The analysis revealed significant differences (p<0.05) among the effect of the various death rates in an industrial accident announcement on abnormal returns of the two day event (Table 7).

Table 7 Event period abnormal returns for death rate in industrial accident announcements

Death rate	Number	Mean abnormal Returns	t-statistics	Median abnormal returns	t-statistics
No death	101	0.05%	2.31*	0.01%	0.12
1-4 death	49	0.13%	1.11	0.03%	1.23
5-8death	33	-0.15	-1.54**	-0.08%	-0.86
>8 death	21	-0.21	-1.99**	-0.01%	-0.11

*p<0.10; **p<0.05;***p<0.01

The effect of cut in production in industrial accident announcements on stock performance

Arguably, one of the top most information managers and shareholders will be looking for in the industrial accident announcement is whether or not the industry involved in the accident will cut production or not and if so for how long. Less than half of the industrial accident announcements sampled (43.6%) announced no cut in production. Over 7%, 35% and 7%, 5% of the industrial announcement reported half a day(0.5), one (1) day, two (2) days and four days cut in

production respectively (Table 8). The market reaction showed significant difference (p<0.05) between the number of days cut in production in an industrial accident announcement (Table 10). Positive abnormal returns were recorded when the industrial announcement revealed no cut in production (0.18%), half a day cut in production (0.16%). However, negative and significant (p<0.05) abnormal returns were recorded when two days (-0.26%) and four days (-0.31%) cut in production were announced. (Table 8).

Table 8 Means of number of days cut/break in production in industrial accidents

Day to cut production	Number	Mean abnormal Returns	t-statistics	Median abnormal returns	t-statistics
No cut	89	0.18	1.23	0.03	0.21
Half a day	15	0.16	1.55**	0.03	0.22
1 day cut	72	0.00	0.23	0.00	0.08
2 day cut	16	-0.27	-1.90**	-0.09	-0.43
4 day cut	12	-0.31	-1.61**	-0.05	-0.17

*p<0.10; **p<0.05;***p<0.01

Correlation of elements/phrases in industrial accident announcements

There is an insignificant correlation (p > 0.05 and p > 0.01) between the type of accidents, the number of deaths, the number of days cut in production and the abnormal stock performance on day before the industrial accidents (Day-1) respectively. However, the types of accident significantly (p<0.01) correlated with the abnormal returns on the day (Day 0), the type of industry involved in the accidents and injury occurrence rate respectively (Table 9). The causes of industrial accidents in announcements showed a significant relation with type of accident (p<0.01) and the injury announcement (p<0.05) respectively. However, insignificant difference were observed in relationship (p > 0.01, p > 0.05) among the causes of the accident and cut in production, the number of deaths and the abnormal returns for the day before (Day -1) as well as the announcement day (Day 0) respectively (Table 9). There is a significant relation (p>0.01) between the type of industry involved in the accident and the injury occurrence rate as well as the number of days the industry cut production respectively. However, the insignificant relation (p>0.05; p>0.01) between the type of industry and abnormal returns on the day before (Day -1) and the announcement day (Day 0) was observed (Table 9). Injuries in the industrial accident announcement have insignificant relating (p>0.05; p>0.01) to the abnormal returns for both days before (Day -1) and the announcement day (Day 0) as well as an element in the announcement such as the cause of the accident and the type of accidents (Table 9).

The involvement of death in the industrial accident announcement has a significant relation (p>0.01) with the number of days to cut production and the abnormal returns on the announcement day (Day 0), but the insignificant relation (p>0.05; p>0.01) with abnormal returns on the day before the announcement (Day -1) respectively (Table 9).

Table 9 Correlation of the content of an industrial accidents announcement

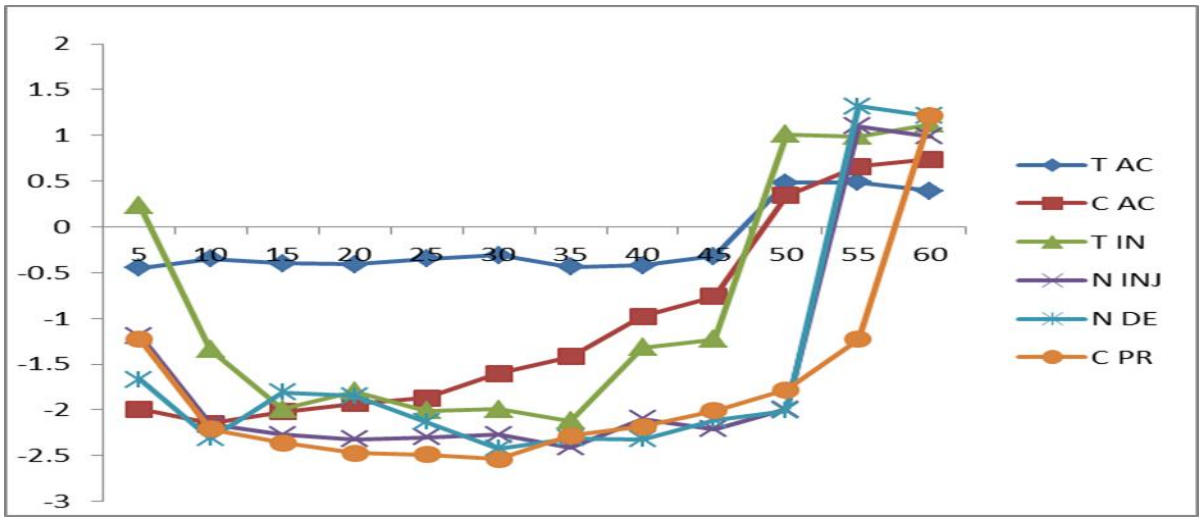
TAC		CAC	TIN	NINJ	NDE	CPR	Day 1	Day0
TAC	-	0.47**	0.27**	-0.09	0.07	0.02	-0.12*	0.14*
CAC	0.47**	-	0.06	-0.08	0.04	-0.02	0.08	-0.07
TIN	0.27**	0.06	-	-0.15*	-0.15*	-0.09	-0.02	0.07
NINJ	-0.09	-0.08	-0.15*	-	-0.15*	-0.41**	-0.07	-0.01
NDE	0.07	0.04	-0.15*	0.15*	-	-0.46**	0.06	0.03
CPR	0.02	-0.02	-0.09	-0.41**	-0.46**	-	0.07	0.04
Day1	-0.12*	0.08	-0.02	-0.07	0.06	0.07	-	0.25
Day0	0.14*	-0.07	0.07	-0.01	0.03	0.04	0.25	-

NOTE: Types of Accident (TAC), Causes of Accidents (CAC), Type of Industries (TIN), number of injuries (N INJ), the number of deaths (NDE) and cut in production (CPR).

Cumulative abnormal returns during 60 days after the industrial accident announcements

In the quest to evaluate the market reactions after the event period, post- announcement abnormal returns for sixty days of the sampled industrial accidents were further analyzed. To be more detailed, cumulative abnormal returns were calculated on each sampled element (types of accident (TAC), causes of accidents (CAC), types of industries involved in the accident (TIN), number of injuries (N INJ), the number of deaths (NDE) and cut in production (CPR) studied in the industrial announcement. Cumulatively, the market reacted negatively to all the abnormal returns of the selected variables studied in this research. The mean cumulative abnormal returns of the types of industries (-0.17%), causes of accidents (-0.89%), types of industries involved in the accident (-1.08%), number of injuries (-1.54%), the number of deaths (-1.59%) and cut in production (-1.79%) accidents revealed a negative cumulative return. The analysis of the post announcement abnormal returns of the causes of accidents (CAC), types of industries involved in the accident (TIN), number of injuries (NINJ), the number of deaths (NDE) and cut in production (CPR) revealed a significant difference (p<0.05). However, a statistically insignificant difference (p<0.05) was observed in the cumulative abnormal returns for the types of accident (TAC) (Fig 1).

Figure 1 Average cumulative abnormal (CRA) return trend
when abnormal returns are cumulated on a daily basis



DISCUSSION AND MANAGERIAL IMPLEMENTATIONS

There is a high probability that, managers are not adhering to industrial accident prevention strategies or employees are not well equipped to reduce errors that caused industrial accidents hence, the cause of increasing man-made accidents. According to Coleman (2006), the frequency of man-made disasters has been on the increased. Mostly, industrial accident types happened unexpectedly, there is little or no indication of their occurrence a day before the industrial accidents announcements were made and this could contribute to the insignificant relation between the type of accident and abnormal returns on the day before the announcement (Day 1) of the industrial accident. However, the significant correlation between the type of industrial accidents, the injury rate and the abnormal returns for the day of the announcement (Day 0) respectively, could be as the result of the level damage described in the announcement, which may have the possibilities of intensifying shareholders panic to react to the market. According to Chen & Siems (2002) industrial accidents can adversely affect capital markets through the creation of uncertainty and panic. The causes of industrial accident significantly related to the type of accident and the number of injuries announced respectively. According to the United State labour department (2010), work fatality and injury rate resulting from fires and explosions rose from 113 in 2009 to 187. The shareholders are not selective in reacting to the causes of industrial accidents. Accidents caused by fire, chemical explosion, earthquake, flooding, typhoon, oil spill, and mind collapse accounted for insignificantly negative abnormal returns indicating that, no matter what causes the accident, the firm will be hit by negative responds from the market.

Per this finding, it would prudent for managers for to adopt a pragmatic safety and preventive mechanism against all kinds of causes of industrial accidents. Earlier studies (such as Shelor et al., 1990; Klassen & MacLaughin 1996) on single disaster have indicated negative abnormal returns on causes of industrial accidents. Chemical industries are prone to industrial accidents more than mining, mechanical, and agriculture, information technology and real estate industries. This could be attributed to the highly inflammable and explosive raw materials used alongside perhaps, the inadequate prevention methods practiced in chemical industries. The significant relation among the type of industries and the injury occurrence rate, the days cut production could predict that, the market is selective in reacting to the rate of injuries after an industrial accident announcement. It is possible that, shareholders use the injury rates to predict the intensity of the accident and evaluate the pragmatic measures that have been put in place to curb injury rates. Hence, the positive abnormal reaction when accidents that contain no injury and 1-4 injuries are announced. However, the market reacted negatively to announcements that contain higher injury rates. This result is in line with Lamb, R. (1995), which indicated that, accidents that led to more than 50 injuries caused a significantly larger stock price decline (-2.77%) than accidents in which less than 50 people were injured (-1.10%). From the results, there are approximately, equal chances of survival and death rate in industrial accidents. This trend could imply that, firm manager's fatalities preventive measures are about fifty percent accurate. Many accidents could be prevented to reduce the seriousness of the consequences. The involvement of death in the industrial accident announcement has a significant negative relation with days to cut production and the abnormal returns on the announcement day (Day 0) but insignificant relation with abnormal returns on the day before the announcement (Day -1). This result could inform managers to put pragmatic measures in place to curb the death rate in industrial accidents since the higher the death rate, the higher the numbers of days cut in production and the lower the abnormal return for the firm involved in the accidents. According to Ayse (2010), human resource management is also found to be positively related to manufacturing performance and significant effect on financial performance. Accidents are unexpected events; thereby, the shareholder could not have pre knowledge about the number of deaths that the accident will result to, hence the insignificant relation to abnormal returns on a day before the announcement of the industrial accident. There is no doubt that shareholders use the death rates in industrial accidents announcement to predict the intensity of the accidents and subsequent consequences. Thus significantly, as the number of death increases abnormal returns declined. However, industrial accident announcements that reported no death resulted in positive abnormal returns. More than half of the industrial accidents studied in this research announced cut in production.

There is no doubt that, accident preventives measures to curb cut in production in most firms are below average. The more the number of days to cut production of the industry involved in the accident, significantly, the less abnormal returns are observed on the announcement day (Day 0) and the higher the injury rate. Lamb, (1995) indicated that injury rates in industrial accidents are inversely proportional to stock price performance. It is possible shareholders, mostly, linked the occurrence of cuts/break in production after industrial accidents to loss of product which could affect firms' revenues. According to Süleyman & Seçkin (2009) disrupting in production process and other losses for repairing and reorganizing affect firms' revenues. The market reacted significantly and positively to industrial accidents announcement that reported no cut in production for the two day event. This indicates that, if managers put adequate measure that can prevent cut in production in industrial accidents, the firms' stock market could see some positive abnormal reaction even before and the day of industrial accident announcement. According to Wang (1993), manufacturing performance has statistically significant effect on the financial performance of a firm. Therefore, the negative abnormal returns recorded when two days and four days cut in production was announced throws more light on how possibly; shareholders see production activities as one of the key factors that regulate abnormal returns of stock markets.

CONCLUSION

This research revealed the impact of the industrial accidents announcement on Chinas' stock market by critically analysing the content of the announcements. Theoretically, this research contributes to an in-depth understanding of shareholder reactions on a firm stock market when an industrial announcement is made. Empirically, the results of this paper have shown that, industrial accidents have a negative impact on stock performance and pose threats that require management attention. The results in this paper could be considered as crucial information for firms operating in China. Shareholders take a critical analysis of industrial accident announcements contents such as types and causes of accidents, types of industries, injury and death rate and cut in production to make their decision about the firm's performances. The market has a diverse reaction in the subdivision of the variables studied. Our result shows that, the market reacted negatively and positively to man-made and natural accidents respectively for the two day event. With the exception agriculture industries, all other industries studied, recorded negative abnormal return for the two day event. Hence our first hypotheses ''the stock market reacts negatively to the types of accident and negatively to the types of industry involved in the accident'' was partially supported. The effect of all the causes of the accidents studied resulted negative abnormal returns. This rejected our hypotheses "the stock market reacts

differently on causes of industrial accident." The market saw increasing injury and death rates and cut in production in industrial accident clearly as a wealth-diminishing effect. From our result, the abnormal returns remained positive in the two day event period for industrial accidents that recorded no injury, no death as well and injury or death rate of 1-4 respectively. However, the abnormal returns declined in industrial announcements that reported 5-8 injuries and more than 8 injuries recorded. This evidence fully supports our second hypotheses 'the stock market reacts differently to death and injury rates in an industrial accident announcement in china. Our hypotheses 'The stock market reacts negatively to cuts in production was partially supported in that, our results revealed positive abnormal returns when the industrial announcement recorded no cut in production, half a day cut in production and showed no returns on a day cut in production. However, negative abnormal returns were recorded when two and four days cut in production were announced. The market's reaction on abnormal returns after the announcement industrial accidents fluctuates; they continuously react inconsistently in abnormal return for more than 35 days. Their reactions on abnormal returns steadily rise beyond 40 days after an industrial accident announcement.

LIMITATIONS & SCOPE FOR FURTHER RESEARCH

Even though inferences of the impact of industrial accident on firms' performance in other countries could be drawn from this research, the results are solely based on the market reaction to industrial accident announcements of listed firms in China. Hence the application of this study is geographically biased. A future research to investigate the impact of the industrial accident announcement on firms' performance in other industrialized countries could also broaden the scope of this study area. Furthermore, a further empirical study to evaluate the impact industrial accident contents, excluding those studied in this paper on the firm's performance could expand literature in this field of study.

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