Does the Type of Food Safety Events Matter? Media Coverage and Stock Price Movement in Response to Restaurant-associated Food Safety Events

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ABSTRACT

This study aims to shed light on risk communication practices dealing with restaurant-associated food safety events depending on the type of events; hazard and outrage. Four food safety events associated with two major fast food restaurant chains, Wendy's and Taco Bell, were examined in terms of their actions dealing with two types of events, E.coli outbreak and outrage events (2X2) by using content analysis and event study methodology (ESM). Content analysis results revealed how differently media covered hazard and outrage cases and ESM results demonstrated the significant impact of the type of events on cumulative abnormal returns. Interestingly, immediate, strong, and negative impact of food safety events on stock price of restaurant firms was detected in a 10-day event window, however, the correlations were attenuated as time goes by regardless of the type of events.

Keywords: Restaurant-associated food safety events, Media coverage, Stock price movements, Content analysis, Event study methodology

INTRODUCTION

The primary role of risk communication is to provide information to the public to induce appropriate levels of concern and actions (Covello, McCallum, & Pavlova, 1987). In the hospitality industry, the vulnerability of restaurants to food safety events has raised the need for restaurants to engage in effective risk communication to decrease revenue loss and to maintain brand image. Typically, restaurants suffer significant financial losses due to foodborne illness outbreaks, which are so-called "Hazard", meanwhile, restaurants also have to deal with rumors and hoaxes that easily evoked "Outrage" (Lundgren & McMakin, 2009). Sandman (1993) introduced the concept that risk is a function of hazard and outrage in the field of risk communication; Risk = Hazard + Outrage. It is asserted that the risks that can kill people and the risks that upset people are totally different, therefore, the way to handle hazard and outrage events should be differentiated in terms of media reporting and restaurant actions

dealing with the outbreak of events.

In dealing with restaurant-associated food safety events, effective risk communication through media is crucial to not only deliver the accurate information, but also prevent unnecessary public outrage (Pidgeon, Kasperson, & Slovic, 2003). The media coverage on food risks is also likely to have sizeable impact on the value of the firms regardless whether the restaurants are solely responsible for such risks. Exaggerated or distorted information might induce overreactions by the public such as significant reduction in purchasing of products associated with events or anti-purchase activities. In order to minimize the negative impact of media reporting, restaurateurs need to engage in effective risk communication through mass media. To assess how restaurants have dealt with restaurant-associated food safety events, this study performed content analysis to gather information of restaurant actions dealing with events, visibility of news reporting, and the type of information about events.

Moreover, even when outrage events do not cause any harms to consumers, immense negative economic impact still occurs. For example, the *E.coli* outbreak in 2006 cost Taco Bell \$20 million in operation profit, however, a hoax about finding a finger in chili cost Wendy's \$2.5 million even though this event was not due to Wendy's fault at all. Therefore, this study examines the stock price movement, an indicator of immediate consumer responses to both Taco Bell and Wendy's events. We included hazard and outrage case for both restaurants to test whether the type of events has an impact on the overall stock price movements. This study would provide useful exploratory tools to examine the impact of food safety events on corporate value for future studies which might include larger samples.

This study aims to explore media coverage about restaurant-associated food safety events and to examine stock price movements after the events across two types of events; hazard versus outrage. Two major fast food restaurant chains, Wendy's and Taco Bell, were examined in terms of (1) their actions dealing with events, (2) media coverage on each event, (3) the impacts of each event on stock prices of restaurant firms, and (4) the relationship between media coverage and stock price movements. Both qualitative and quantitative approaches, content analysis and event study methodology (ESM), were adopted to assess the media coverage and to measure the economic impact of events on the value of restaurant firms.

LITERATURE REVIEW

Food safety events and media coverage

Risk communication has played an important role among consumers, companies, and the media (Lundgren & McMakin, 2009). Communication about food risks has been a major issue for both consumers and restaurant operators given that the restaurant industry is one of the largest industries whose risk communication heavily relies on media including the internet, magazines, and television. Food risks with a small probability have proved to evoke a great amount of fear which results in a decrease in consumption, loss in revenue, and even economic depression (Morgan, Fischhoff, Bostrom, & Atman, 2002). Previous events have shown that numerous restaurant-associated food safety events have provoked widespread fears in consumers in the last decade (Pidgeon et al., 2003), thus, there is a need for exploring media reporting of restaurant-associated food safety events.

Examining media coverage is useful to assess the effectiveness of strategic movements of companies. Visibility indicates the amount of information about firms' movements in response to any events or attacks from competitors (Chen & Miller, 1994). High visibility of information about companies' behaviors might draw salient external attention, both consumers and stakeholders (March & Olsen, 1976). Competitive behaviors of airline companies were examined by Chen and Hambrick (1995) in terms of the speed, visibility, and types of actions taken by small and large airline companies by reviewing airline news journal, *Aviation Daily*. The authors found that small airline firms were speedy and visible in initiating competitive behaviors, however, large airline firms were faster to respond when attacked to protect their reputation.

Along with the visibility of information about restaurant actions covered by media, this study also will examine the type of restaurant actions; recall, closure of restaurants, apology, public relations, and training. Communication research has described categories of the type of information related to risks; identification, exposure, and effects (Morgan et al., 2002), which was expected to influence consumer reactions to media reporting. An examination of media coverage on restaurant-associated food safety events will enable us to explore how the information related to such events has been communicated to publics.

Restaurant-associated food safety events and stock market reactions

Stock market reactions to crises were examined by a few previous research in hospitality industry. For example, the impact of SARS on Taiwanese hotel stock prices was studied by Chen, Jang, & Kim (2007), revealing the significant negative impact of SARS on hotel sectors. The high sensitivity of hotel stocks to SARS compared to other sectors such as manufacturing companies implied that hospitality industry is more vulnerable and reactive to such crises. Previous restaurant-associated food safety events evidenced that restaurants are vulnerable to food safety events (Harvard Business Essentials, 2005). The outbreak of *E. coli* in 1993, in which seven people died from eating contaminated food at Jack in the Box showed the huge impact of a restaurant-caused crisis (Braun-Latour et al, 2006). In order to recover brand image, Jack in the Box had to take actions such as changing meat suppliers, retraining employees to ensure cooking temperature, and offering price discounts. Taco Bell was also revealed as a source of *E. coli* outbreak in 2006 which resulted in foodborne illness of seventy-one people who got sick or hospitalized after eating foods at Taco bell in four states. In response to this outbreak, Taco Bell recalled all the green onions from their nationwide franchising stores in the U.S.

Restaurant-associated food safety events are not always caused by the restaurant itself. In 2007, a rat video on Youtube recorded at a KFC/Taco bell store in Manhattan. Due to consumers' fear and disgust towards their stores, thirteen restaurants in Manhattan were shut down after the release of the Youtube video. Even though it was found out later that this event was partly due to some construction in New York City, the immense negative impact on brand image was very large. Although those cases were not related to foodborne illness outbreaks, they resulted in sizeable economic impacts on the restaurant firms. However, the economic impact of restaurant-associated food safety events on stock prices has not been demonstrated by any previous research, which raised the significance of this current study.

Type of food safety events: Hazard versus Outrage

Risk is often defined as the function of uncertainty and severity of consequences (Bauer, 1960). A risk can be categorized into hazard or outrage depending on its core concept. Sandman (1993) provided a fundamental framework of risk communication by introducing the concept of hazard and outrage. He defined risk as a function of hazard and outrage: Risk = Hazard + Outrage. Hazard is what risk assessments are assigned to estimate such as salmonella, *E. coli*, and hepatitis A. In contrast, outrage is everything related to risks except how likely it is to be harmful (Covello et al., 2002).

At times, people are even terrified by an event which is not associated with foodborne illness but caused "social shock or outrage" (Lawless, 1977). For example, in 2005, Wendy's suffered from a hoax titled "A woman found a finger in Wendy's chili" which costs Wendy's \$2.5 million to recover its brand image (Braun-Latour, Latour, & Loftus, 2006). Due to the huge negative impact of "social shock or outrage" driven by intentional food safety events, restaurants should have crisis management plans in place to recover the brand image regardless of their accountability for the risks.

Gaining attention by releasing numerous information via media about events could function in either positive or negative ways. Regarding the negative nature of both food safety events, it is arguable how much to inform the public about the risks (Sandman, 1993). In dealing with hazard cases, it is crucial to deliver accurate and immediate information, however, little public attention is desirable for restaurants associated with outrage cases. Therefore, we expect to see the differences in stock price movements and media coverage depending on the type of events.

Hypothesis 1: The impact of restaurant-associated food safety events on the restaurant's stock price movements will vary depending on the type of events (Hazard/Outrage).

Stock market reactions and media coverage

The relationship between the media and stock market has been demonstrated by previous research. Tetlock (2007) examined the role of media in the stock market and found that while high media pessimism was a good predictor of downward pressure, unusually high or low pessimism predicts high market trading volume. More recently, Tetlock et al (2008) tried to predict individual firms' accounting earnings and stock return by examining linguistic media content. They found that the fraction of negative words in firm-specific news stories predicted low level of firm earnings.

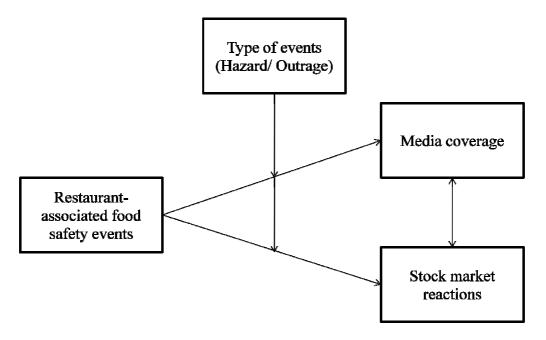
The impact of earnings announcement on stock prices was demonstrated, in addition, stock prices were found to be most reactive to the type of earnings emphasized by the press (Dyck & Zingales, 2003). It was found that companies with fewer analysts and credible media outlet showed stronger impacts of earnings announcement on stock prices. Moreover, daily movements of stock prices in response to economic news such as inflation, money supply, and real economic activity were examined by Pearce and Roley (1985) and results supported that economic news related to monetary policy significantly affected stock prices. Lack of evidence on the impacts of inflation and real economic activity was found, supporting that the impact of media coverage on stock prices varies depending on the type of

economic news. The findings of Vega (2006) supported that the information type, private or public information, was found to be a predictor of stock price reactions.

In the field of public health, Chapman and Dominello (2001) compared news releases in New South Wales metropolitan media over 5 weeks with the background coverage of tobacco control issues over the same period. Results indicated that 58 of 283 (20.5%) news reports on tobacco in the study period were generated by the six media releases. They concluded that strategic use of news releases alerting journalists to research reports can increase news reportage of tobacco control significantly. This is considered inexpensive strategy with great potential to advance public health objectives. While numerous research has examined the relationship between media coverage and stock price of firms, lack of research was conducted with restaurant firms. Due to the undiscovered relationship between media coverage about restaurant-associated food safety events and stock price movements, this study aims to test whether the relationship is significant or not.

Hypothesis 2: There is a relationship between media coverage about restaurant-associated food safety events and the restaurant's stock price movements.

Figure 1
Model of hypothesized relationships between restaurant-associated food safety events and stock market reactions and media coverage



METHODOLOGY

Qualitative approach: Use of Content analysis for Media Coverage about Restaurant-associated Food Safety Events

Over the past decade, the U.S. has experienced restaurant-associated food safety events almost once a year. For the purpose of this study, four events associated with two restaurants (Taco bell and Wendy's) were selected because they both suffered the same *E. coli* outbreaks in 2006 as well as outrage cases in 2005 and 2007 (Table 1). To examine the changes in media coverage on each event, the timeline of event outbreak was provided in Table 1.

Content analysis was performed by reviewing the top three online versions of newspapers with national circulation: New York Times, Washington Post, and USA today. All the news items including keywords, a restaurant name and event, published within one month since the outbreak of each event were scanned and the number of keywords was counted by trained researchers familiar with food safety events. The coding results were validated by testing inter-rater reliability using SPSS. Google archive allowed us to search for media reports published in the three newspapers within specific periods. The coding sheet for content analysis contained the search term (restaurant name), the type of online news used for search, date, title, keywords, and URL of each article. Lastly, the total number of news items on each day will be used to test the correlation with stock price movement.

Table 1
Type and Timeline of Food Safety Event Outbreaks

	Hazard	Outrage
Taco Bell	E.coli outbreak	Rat video
	Dec 4 th , 2006	February 22 nd , 2007
Wendy's	E.coli outbreak	Finger in chili
	Aug 2 nd , 2006	March 22 nd , 2005

Event study methodology (ESM): Impact of events on stock prices

In order to test hypothesis 1 and 2 by estimating the impact of media coverage about food safety events on restaurant firms, this study adopted event study methodology (ESM). ESM has been utilized in financial research to measure the economic effect of an event on the value of the firm (Campbell, Lo, & MacKinlay, 1997). For example, the effect of announcement of merger and acquisition on the future value of a firm and the impact of protest on individual firms were examined by using ESM (Dodd & Warner, 1983). The current study attempted to examine stock price movement of restaurant firms. The advantage of using ESM enables us to identify the stock price movement due to firm-specific events, not to market-wide movement (Chen et al., 2007).

First, we calculated abnormal return (AR), an indicator of impact of event, as a difference between actual return and expected return around the time of the event. If the value of AR is positive, the event can be considered as good news and the future profitability of the firm is positive. If the value of AR is negative, event can be bad news which leads to the prediction of negative future profitability.

We first obtained one-month stock price data after the beginning date of four event outbreaks. The market model (MM) was chosen to measure the expected returns (ER) of stocks of two restaurant firms. First, we regressed the stock return of restaurant firms against the return of market index driven from S&P 500 in order to control for the overall market effects (Equation 1, 2).

$$R_{i,t} = \alpha_{i+} \beta_i R_{m,t+} \epsilon_{i,t}$$
 (Equation 1)

$$R_{i,t} = \ln(P_{i,t}/P_{i,t-1}) \times 100$$
 (Equation 2)

 $R_{i,t}$; the return of restaurant firm's stock j on day t

 $P_{i,t}$: the closing price of stock j on day t

 $R_{m,t}$: the return of market on day t

The expected return (ER) was obtained by conducting ordinary least squares (OLS) regression analysis (Equation 3). Finally, abnormal return (AR) was calculated by subtracting the expected return from the stock return (Equation 4). The value of AR indicates that how stock return has been changed due to the firm-specific event in separation of overall market movements.

$$ER_{j,t} = \hat{\mathbf{a}}_{j} + \beta_{j} R_{m,t}$$
 (Equation 3)

$$AR_{j,t} = R_{j,t} - ER_{j,t}$$
 (Equation 4)

The next step was to calculate standardized abnormal returns (SAR) to normalize the conditions of both Taco Bell and Wendy's (Equation 5). After computing SAR, cumulative abnormal returns (CAR) were obtained by summing SARs within a 10-day event window (Equation 6).

$$SAR_{j,t} = AR_{j,t}/S_{j,t}$$
 (Equation 5)

$$CAR_i = 1/\sqrt{m} \sum CAR_i$$
 (Equation 6)

The ESM suggests that a post event period which is too long will not be accurate due to the possible external factors occurring in the same period. In this sense, this methodology allowed us to measure the impact of an event during a relatively short post event period. As such, we examined stock prices within one month after the outbreak of events.

RESULT

Qualitative Results of Content Analysis

The largest number of news items (n=28) was reports about *E. coli* outbreak associated with Taco Bell restaurant in 2006. Most of news items covered identification (n=22, 78%) and exposure (n=23, 82%) to report the current situation and to alert the public to avoid risks. The notions of authorities such as federal officials or health inspectors appeared in most of items (n=21, 75%) to convey the reliability of their reports. In contrast, in reporting outrage food safety cases, authorities were mentioned less than half (n=7, 38%) percentages of total news items and almost the half of news items (n=8, 44%, n=7, 46%) covered identification of the situation.

Regarding reported actions taken by restaurants, there was a significant disparity in

media coverage depending on the type of food safety events and the severity of events. Taco bell restaurant in 2006 showed the most various actions (n=11) among four cases in order to deal with *E. coli* outbreak that resulted in illnesses of 39 people. They took active actions such as shut-down of restaurants (n=2, 18%) and discard of suspected contaminated foods (n=5, 45%). In dealing with rat video event which happened three months after the previous outbreak, they had to take immediate actions not only closing restaurants (n=3, 30%) but also focusing on public relations (n=5, 50%). In contrast, Wendy's seldom took actions to deal with finger in chili case which was totally a hoax, not caused by Wendy's fault. They start to release news only after the event was found to be a hoax. Wendy's seemed to take advantage of "no news" strategy not to evoke any uncomfortable consumer reactions to this event (Chan, 2003).

Table 2
Contents of Media Coverage on Restaurant-associated Food Safety Events

	Hazard		Outrage	
	Taco Bell	Wendy's	Taco Bell	Wendy's
	E. coli	E. coli	Rat video	Finger in
	(2006)	(2006)	(2007)	chili
				(2005)
Total number of news items	28	4	18	15
Identification	22	4	8	7
Exposure	23	4	0	0
Effects	7	0	0	0
Authority	21	4	7	7
Restaurant actions (Total)	11	2	10	3
Close/ Shut-down	2	0	3	0
Recall/	5	0	0	0
Discard products				
Employee retraining	1	0	0	0
Sanitizing/	1	1	1	0
Re-inspection				
Public relations	2	0	5	3
Apology	0	1	1	0

Quantitative Results of Event Study Methodology (ESM)

It was found that stock prices of two restaurants reacted differently to both hazard and outrage events. While CAR of Taco Bell was dropped after both hazard (-2.271 -> -4.528) and outrage event (0.332 -> -2.075), which was consistent with prediction, Wendy's showed reversed result that CAR was even increased after both hazard (-3.603 -> 0.992) and outrage event (-2.313 -> 2.662) (Table 3). This result can be interpreted as lack of awareness about Wendy's cases compared to that of Taco Bell cases regarding high visibility of media coverage about Taco Bell rather than that of Wendy's. In addition, the severity of Taco Bell *E.coli* outbreak case was higher than that of Wendy's *E.coli* outbreak case, which might be another hidden cause of these results.

ESM results also revealed that the type of food safety events has a significant impact on cumulative abnormal returns (F=7.681, p<.05) (Table 4) supporting the hypothesis 1

(Table 6). This result indicated that stock prices reacted more negatively to hazard cases than to outrage cases.

Table 3
Mean of cumulative abnormal returns (CAR) depending on 10-day event window (pre/post) and type of events (hazard/ outrage)

Restaurant	10-day event window	Hazard	Outrage
Taco Bell	Pre ^a	-2.274	0.332
	Post ^b	-4.528	-2.075
Wendy's	Pre	-3.603	-2.313
	Post	0.992	2.662

^a Pre: 10-day before the event outbreak ^b Post: 10-day after the event outbreak

Table 4
ANOVA results of cumulative abnormal returns (CAR) depending on 10-day event window (pre/post) and type of events (hazard/ outrage)

Source	Type III Sum	Df	Mean Square	F	<i>p</i> -value
	of Squares				
Time	27.914	1	27.914	5.262	.083
Type	40.745	1	40.745	7.681	.048*
Time × Type	13.157	1	13.157	2.480	.190
Error	21.219	4	5.305		
Total	103.109	8			

a R Squared = .794 (Adjusted R Squared = .640) p < .05

In order to test hypothesis 2, we extended the magnitude of event window from 10 days to 30 days in order to test correlation between media coverage and abnormal returns (AR). AR is chosen because it is a good indicator of daily stock price movements. The correlation matrix revealed that the correlations between media coverage and AR tend to be higher in a 5-day event window and lower in a 20-day event window (Table 5). In the 5-day event window, three cases showed the highest negative correlation between media coverage and AR (r=-.784 for Taco bell and *E. coli* case; r=-.690 for Wendy's and *E. coli* case, and r=-.705 for Wendy's finger in chili case), which partially supported hypothesis 2 (Table 6). However, it was shown that the strong negative relationships were attenuated as time goes by for all four cases, which revealed the immediate impact of food safety events on restaurant firms reflected by stock price movements.

Table 5 Correlation of AR and number of news articles published within 5 days, 10 days, and 20 days event windows

	Hazard		Outrage	
Event window	Taco Bell	Wendy's	Taco Bell	Wendy's
	E. coli	E. coli	Rat video	Finger in chili
	(2006)	(2006)	(2007)	(2005)

[0, 5]	784	690	328	705
[0, 10]	373	237	378	623
[0, 20]	.157	032	264	246

[0,5]: 5 days after the outbreak, [0,10]: 10 days after the outbreak, [0,20]: 20 days after the outbreak

Table 6
Hypotheses testing

Hypothesis	Test result
Hypothesis 1: The impact of restaurant-associated food safety events on the restaurant's stock price movements will vary depending on the type of events (Hazard/Outrage).	Supported
Hypothesis 2: There is a relationship between media coverage about restaurant-associated food safety events and the restaurant's stock price movements.	Partially Supported

CONCLUSION AND IMPLICATIONS, LIMITATIONS

This study investigated media coverage and stock market reactions to two types of restaurant-associated food safety events, hazard and outrage, by performing content analysis and event study methodology (ESM). Content analysis allowed us to explore the visibility of information about events, types of risk information, and types of restaurant actions dealing with two different types of events. In dealing with hazard case, the high visibility of media coverage was found, however, relatively low level of visibility on outrage cases was detected providing evidence of "no news" strategy. This result suggested that it is important to differentiate strategies depending on whether the event causes harmful risks or just upset people.

The results of ESM demonstrated that while Taco Bell showed negative impact of both events on their stock price (reduction in CAR), Wendy's did not experience any negative impact of both events on their stock price (increase in CAR). This contradictory result revealed the different level of awareness and severity of events. Regarding the higher number of media reporting on Taco Bell cases compared to that of Wendy's, consumers and stakeholders might not pay attention to events associated with Wendy's as much as to Taco Bell events. Moreover, the correlation results between media coverage and stock price movements revealed the immediate, strong, and negative impact of food safety events on stock price of restaurant firms. As time goes by, the correlations were attenuated regardless of the type of events and the severity of risks.

This study provided useful tools to examine risk communication practices. From the theoretical perspective, use of content analysis and event study methodology enables researchers to investigate media coverage and its economic impacts associated with restaurant-related events. Practical implications include evidences of different types of information by media depending on the type of food safety events, which significantly can affect stock prices of restaurant firms. Due to the lack of cases representing restaurant-associated food safety events occurred in the past, a further analysis with more cases is needed to replicate the results of this study. Future studies are recommended to use other

financial or marketing indicators to measure the impact of event or media coverage on the value of restaurant firms.

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