

Title: Corporate social responsibility and food risk management in China; a management perspective

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**Abstract:** This study aims to find relationship between corporate social responsibility (CSR) and food risk management (FRM), and other affecting factors of FRM in China. This is considered from the perspective of food company managers located in 161 food companies surveyed in Henan Province and Wuhan City, China. The results indicate that the company's attitude (defensive/passive/proactive) to CSR affects its attitude to food risks, and the CSR performance of a company affects the effectiveness of its FRM measures. With better CSR performance, a company experiences less risk than the ones with poor CSR performance. Among other FRM affecting factors, the budget allocated to FRM is the direct affecting factor. Finally policy suggestions are made.

**Keywords:** Corporate Social Responsibility; Food Risk Management; China

## **1. INTRODUCTION**

With the rapid economic and population growth in China over the past thirty years it is perhaps unsurprising that China's food industry has also developed very fast. The average annual growth rate of the gross value of output from the food industry in China was over 13% from 1980 to 2001 (Bai et al, 2007), and 25.2% from 2005 to 2010 (Xiong, 2011). But along with this 'high speed' development there has been an increasing concern with food safety. Food safety initially emerged in China as a trade issue in the early years of the 21st century but has now become an important domestic issue (Wang et al, 2008). Indeed food safety has become a major concern in domestic food markets since 2003 due to a string of serious food safety related incidents.

In 2008, just before the Olympic Games in Beijing, six babies were killed and 300,000 were left sickened after consuming infant formula contaminated with the industrial chemical melamine (Chen, 2009). In April 2011, police in the north-eastern city of Shenyang seized 40 tonnes of tainted bean-sprouts. The vegetable had been treated with sodium nitrite and urea, as well as antibiotics and a plant hormone called 6-benzyladenine. The chemicals were used to make them grow faster and look 'shinier' in market stalls (AP, 2011). Clenbuterol, known as 'lean meat powder', can

accelerate fat burning and muscle growth, making it an attractive feed additive, sports performance enhancer and slimming drug, but overdoses can cause illness and, in rare cases, death. In 2006, more than 300 people in Shanghai were sickened by pig products tainted with the chemical. In 2009, 70 people were hospitalized in Guangzhou after eating tainted pig organs, and in 2010, 13 people in Shenzhen were hospitalized after eating clenbuterol-tainted snake (Olesen, 2011). Published research has claimed that up to 10% of rice sold in China has been contaminated with cadmium, a heavy metal known to cause cancer (Mahr, 2011). Other related incidents include fraudulent products and sale of food beyond its expiration date; microbial contamination is an on-going problem that results in many illnesses and deaths in the country.

Recent opinion polls rank food safety among the top concerns of Chinese consumers, and as China is rapidly evolving as an export country for foodstuff, especially dry milk products, China is currently facing demands from both home and overseas to improve its food safety record (Broughton et al, 2010; Pei et al., 2011). The Chinese Government has begun to be concerned with food safety and is paying increasing attention to the country's food safety system (Zhang, 2005). The major action instigated by the government was the issue of Food Safety Law of the People's Republic of China, which was promulgated and came into effect on the 1st June, 2009. It contains 104 rules in 10 chapters including General Provisions, Monitoring and Assessment of the Food Safety Risks, Food Safety Standards, Food Production and Business Operation, Food Inspection, Import and Export of Food, Handling of Food Safety Accidents, Supervision and Administration, and Legal Liabilities. The new law intends to address the deficiencies of the previous food safety regulations such as institutional fragmentation with responsibilities spread out across several ministries (Chen, 2009), and to upgrade the official control infrastructure and introduce a recall system.

Given the scale and importance of the problem there have been various studies focussing on the area of food safety in China, and the discussions are centred mainly on three aspects. One of them is focussed on consumers' perceptions regarding food safety issues and their demand for safe food. Zhang (2005) implemented a case study in a large Chinese city, Tianjin, to try to gain insights into Chinese consumers'

knowledge and concerns over food safety. The results indicate that Chinese consumers are, unsurprisingly, very much concerned about food safety, particularly with regard to vegetables and dairy products. However Chinese consumers seemed to know little about related topics such as genetically modified (GM) and organic food. It was also found in the same study that young and highly educated consumers are willing to buy GM food in the future once it is explained to them what GM food is and the benefits that it brings. Wang et al (2008) surveyed consumers in Beijing regarding their awareness of, willingness to pay the price premium for milk products which have been subject to Hazard Analysis Critical Control Point (HACCP) management; a quality management system used to reduce food safety risks. It was found that less than 20% of respondents had heard of HACCP, and after receiving information on HACCP then nearly all respondents were willing to pay a modest price premium for HACCP-certified products. Hence Wang et al. (2008) concluded that the demand for food safety attributes is increasing amongst Chinese consumers. Kim (2012) conducted a comparative study in China and Korea to understand how consumers evaluate the quality of the food risk management practices that are performed by their respective governments and to determine the underlying psychological factors influencing consumer evaluation. It was found that the perceived expertise of food managers was the most important influencing factor for Chinese consumers, while the company's proactive consumer protection programme was most important for Korean consumers to evaluate a company's food risk management. Levels of scepticism of consumers regarding how food risks are assessed and communicated by authorities and scientists was found to be the second most important factor in both Korea and China.

Another aspect focuses on the discussions of food safety regulations and their implementation (incentives and barriers) at both national and company level. Pei et al (2011) compared the EU and Chinese systems of food safety regulation for dairies and noted that China's new General Food Law is similar to the European General Food Law in many ways, but China still needs to provide more guidance on specific sub-areas. They argued that the Chinese system concentrates more on the end-products, while the EU quality assurance approach considers risks during the whole food chain process. The Chinese quality control system assumes that the removal of the low quality end products is the major part of risk management, which is in accordance

with UN's (2008) statement, 'the enforcement in China of food control places an excessive reliance on end-product testing with very little use of auditing as an inspection tool'. Pei et al, (2011) further concluded that China's system is not a good system for risk management. They provide suggestions regarding the upgrade of China's regulatory framework along with the resulting costs and benefits. Bai et al, (2007) discussed detailed food safety assurance systems in China. They have argued that stringent government legislation can indeed be successful in pressurising the large food firms to produce safe food due to their high public visibility, but the food safety issue of millions of small food firms can only be solved by encouraging voluntary implementation of the legislation.

Some food safety related studies have attempted to bring Corporate Social Responsibility (CSR) into the picture. Kong (2012) considered the milk contamination scandal in China as a CSR-related event, and by comparing the stock market prices of food companies before and after the scandal he concluded that food companies' CSR-related activities can influence investors' trading behaviours at least in a short period of time after the event, but not before it. He suggested that authorities should encourage food companies CSR activities because food companies can obtain long-term benefits by being strong in CSR engagement.

With strong consumer demand for safe food and the direction of government legislation food companies will no doubt try harder to ensure their product is safe, but in such a large, geographically spread and diverse food producing and processing industry as that of China, and given the fact that there are still deficiencies of the current food safety system as discussed above, it is still to a great extent up to the companies as to how far they want to go in producing safe food. This is where the concept CSR could play a major role as noted by Kong (2012). However, this linkage between CSR and food safety in China has received remarkably little attention. CSR recognizes that corporate growth and profitability are important, but it also requires a firm to pursue societal goals such as environmental protection, social justice and equity (Wilson, 2003; Moon, 2007; Lee, 2008; Bazin, 2009; Weyzig, 2009; Freeman et al, 2011). CSR stresses that each firm should not just stick to the direction they receive from legislation, as important as that is, but also take initiatives on their own to assume their social responsibilities. Given the very large number of companies

involved, any solution to the wide spread food safety crisis in China has to rest at least in part upon CSR. Only a socially responsible firm could be able to take full responsibility for the safety of their product. Although Bai et al. (2007) and Kong (2012) indicated that voluntary implementation of food safety regulations and engagement of CSR activities could solve our current food safety dilemma, none of them actually looked at the potential role of CSR may play to the improvement of food risk management, especially from the food company management's perspective. Yet this can be assumed to be an important linkage; a sense of CSR by the firms should help facilitate food safety.

The research summarised here aimed to explore the potential relationship between CSR and FRM of Chinese food companies from firm managers' point of view. It is the first such study of its type and was founded upon the following key questions:

- (1) Has a company's attitude to CSR influenced their way of risk management?
- (2) Is there a connection between the CSR performance of a company and the effectiveness of their risk management measures?
- (3) What other factors can affect the effectiveness of a food company's risk management measures?

Evidence to address these questions has been drawn from a group of 161 food companies based in Henan Province and Wuhan City of Hubei Province in China.

## **2. METHODOLOGY**

### **2.1 Sampling frame**

A convenience sampling method was employed, and 180 food companies based in Henan Province and Wuhan City in China were selected because they had business connections with one of the author's institution. Each company was given a questionnaire to complete, and the targeted respondents were managers who were

responsible for product safety. A total of 161(89%) managers returned a valid questionnaire (Table 1). Of these returns:

- 126 (78%) were located in Henan Province and 35 (22%) were in Wuhan City.
- 156 indicated the history of their companies, in which, 21 (13%) were founded after 2006, 49 (30%) were founded between 2000 and 2005, 68 (42%) were founded between 1990 and 1999, and 23 (14%) of them were founded 22 years ago.
- Almost half of the companies were private (52%), 35 (22%) of them were sino-foreign joint ventures, 19 (12%) were public listed companies, 17 (11%) were state-owned companies, and the rest (7%) were other type of companies such as individually-owned business.
- 156 indicated their registered capitals, in which, 40 (25%) had more than 10 million Yuan RMB of registered capital, 22 (14%) were registered with 5-10 million Yuan, 39 (24%) with 1-5 million Yuan, 27 (17%) with 0.5-1 million Yuan, while the rest 33 (20%) had 0.5 million Yuan or less of registered capital.
- 156 indicated the number of employees, in which, 19 (12%) had more than 1000 employees, 25 (16%) had an employee number of 501-1000, 51 (32%) had 101-500, 21 (13%) had 51-100, and 45 (28%) had 50 or less employees.

The above descriptive information of company size, scale, history and ownership within the sample indicates that it was broadly representative of the landscape of Chinese food companies.

<Table 1 near here>

## 2.2 Data collection

After a pilot study in December 2011, the questionnaire was finalized and comprised a mix of closed and open-ended questions aimed to uncover food companies' current FRM and CSR situation as well as the manager's attitude to food risks and CSR. The mix of closed and open-ended questions was deemed to be important as it allowed the

respondents to raise issues that they regarded as important but were not necessarily covered in the closed questions. Given that such studies on the relationship between FRM and CSR are relatively new in China this flexibility was felt to be important. Only the General Manager or the food safety manager (if they had one) was interviewed; thus there was one respondent for each company. The fieldwork was undertaken in Henan Province and Wuhan City simultaneously from February to April 2012.

The Henan Province component of the survey was carried out by 5 undergraduate students based in Henan Agricultural University, and the Wuhan part was carried out by one undergraduate student from Wuhan University. The questionnaires were administered via face-to-face interview, telephone interview and email. All students received survey skills training before the survey, including understanding of the survey questions, how to approach respondents etc. Of the 161 valid questionnaires received, 100 in Henan Province and 20 in Wuhan were completed face-to-face, 10 in Henan and 2 in Wuhan were completed by telephone interview and 29 questionnaires were completed via email.

After investigating the food safety regulations and based on the outcome of the pilot study, a set of indicators including FRM related indicators and CSR related indicators were set up (Table 2). FRM related indicators include indicators of the current situation of FRM, company's attitude to risks, and effectiveness of FRM. CSR related indicators include current CSR performance and company's attitude to CSR.

<Table 2 near here>

The current situation regarding FRM was measured by 7 indicators: level of support that managers gives to FRM, the changing trend of the level of support that the managers give to FRM in the last 5 years, the budget for FRM, status of the FRM early warning system, trainings managers received regarding risk communication, and trainings managers received regarding risk management in general. The budget for FRM is measured based on the managers' responses to questions such as 'what is the perceived percentage of the yearly budget that should be spent on FRM?' and 'what is the actual spend?' The rest of the indicators were measured on a 5 point Likert scale



with 1 being the lowest and 5 being the highest, for example, when asking about the status of early warning system, if the answer is ‘No early warning system at all’, then the rank is 1, and if the answer is ‘yes, we have complete warning system’ then the rank is 5, and the ranks of any other answers fall in between.

The company’s attitude towards risk was also measured based on the managers’ views. One of the following 3 possible attitudes could be selected: defensive (taking no action when the crisis arises), passive/reactive (taking actions during the crisis as responses to the public/media pressure), and proactive (having measures in place before crisis). Finally the ‘effectiveness of FRM’ indicator was assessed by the occurrence of food safety incidents (OFSI<sup>1</sup>) with high OFSI indicating low effectiveness of FRM and low OFSI indicating high effectiveness of FRM.

The current CSR performance indicator was assessed based on the perception of respondents regarding their own companies’ CSR performance on a 1-5 scale with 1 being the lowest and 5 being the highest. As with the company’s attitude to risks, their attitude to CSR was chosen from 3 possible attitudes: defensive (no CSR apart from profit making), passive/reactive (taking responsibility only when legally required), and proactive (taking as part of the company strategy).

### 2.3 Data analysis

SPSS 19.0 was employed to store and analyse data using a mix of correlation analysis, crosstab and regression.

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<sup>1</sup> OFSI: Occurrence of Food Safety Incident.

### 3. RESULTS

#### 3.1 The current FRM situation of the case companies

During the survey, the authors investigated the occurrence of food safety incidents (OFSI) linked to the case companies for the last 3 years based on the report from the managers (Table 3). Total maximum occurrence of all types of food safety incidents happened to one company in the last 3 years was 32 times, and the most frequent incident was ‘product being illegally copied by competitors’, then it is ‘recall’, ‘employee being sluggish at work’, and ‘sharp reduction of profit’ etc. It indicates that the perceived risk within the food industry was mainly linked to a product being illegally copied by competitors and product recall. This result is different from what people would expect to be the most frequently occurred food safety incident – producing unsafe food. However it might give us insight in this regard that it is the accumulation of less noticeable food safety issues that led to the world-alarming national outbreak of food poisoning incidents in China in recently years. Hence the day-to-day FRM is crucial to the whole FRM situation, and the managers in the survey obviously did not see the importance of it.

The above observation is further confirmed by the descriptive analysis of the current FRM situation in Table 4. With 1 being the lowest and 5 being the highest, the average rank of the status of early warning system was 3.53. If we take rank 4 out of 5 as being satisfactory, and anything less than 4 as being unsatisfactory. Then the early warning system of the companies was not sufficient. A more detailed analysis of the status of the early warning system indicates that more than 40% of the managers admitted that they did not have or they did not know if they have an early warning system in place. No wonder only 55% of companies claimed to be alarmed by previously happened incidents, and of which, only 35% said they had actually taken measures to prevent future incidents. It seems clear that FRM situation of the surveyed companies was not encouraging. It is not a surprise that the surveyed companies spent only 6.67% of their yearly budget on FRM even though the expected spend was 7.88% (Table 5).

<Tables 3, 4 and 5 near here>

In contrast to the point made above, Table 4 also indicates that the company managers were generally supportive of food risk management (with an average rank of 4.34), although they were less satisfied with the training they received regarding risk communication and risk management with average marks of 3.51 and 3.46 respectively. When they were asked about their companies' attitudes to risks, 93.2% of the surveyed companies claimed that they took proactive actions. The contradiction of the survey result indicates FRM is actually not a priority for Chinese food companies. Managers are 'talking the talk', instead of 'walking the walk'. This casual attitude of managers towards FRM might have contributed to the happening of series of food safety incidents, and it will certainly not help prevent future incidents.

### 3.2 Corporate social responsibility and food risk management

The poor FRM situation in Chinese food companies indicates the urgency of promoting FRM. As discussed in 1 Introduction, voluntary implementation of food safety legislations of the companies could solve the food safety issues in China. Hence it may be assumed that a company's attitude to CSR might affect its attitude to food risks – a defensive/passive/proactive CSR attitude might be related to the same type of attitude to risks.

Table 6 indicates that companies' attitudes to CSR and to food risks were strongly correlated. The result of regression analysis (Table 7a, b) indicates that the company's attitude to CSR positively affects its attitude towards food risks (P value for both coefficient < 0.001 and  $R^2$  of 0.102). Crosstab analysis (Table 8) between CSR performance of each company and their OFSI in the past 3 years shows that the occurrence of food safety incidents for companies with CSR performance mark of 2.5-5 (better CSR performance) is 165, and for companies with CSR performance mark of 1-2 (worse CSR performance) is 586. Clearly companies with good CSR performance experience less risk than those with less good CSR performance. It indicates that the CSR performance of a company does seem to be related to the effectiveness of the risk management.

<Tables 7 and 8 near here>

### 3.3 Other affecting factors of OFSI

The result of a correlation analysis between OFSI of each company in the past 3 years and other factors that might affect it is shown in Table 9. The possible 'affecting factors' include level of support the manager gives to FRM (F1), changing trend of the level of support that the manager gives to FRM in the last 5 years (F2), budget for FRM (F3), status of the FRM early warning system (F4), the amount of trainings managers received regarding risk communication (F5), the amount of training managers received regarding risk management (F6), the perceived importance of FRM for improving organizational behaviour (F7), the change of profit over the past 3 years (F8). It was found that factors such as level of support the manager given to FRM (F1), changing trend of the level of support that the manager gives to FRM in the last 5 years (F2), the amount of training managers received regarding risk communication (F5), and the change of profit over the previous 3 years (F8) are not related to OFSI. Therefore there are four significant affecting factors, which include budget for FRM (F3), status of the FRM early warning system (F4), the amount of training managers received regarding risk management (F6) and the perceived importance of FRM for improving organizational behaviour (F7).

<Table 9 near here>

To further understand the relationship between OFSI and its affecting factors, a multiple regression analysis was carried out (Table 10a, b). The results indicate that with an adjusted  $R^2$  of 0.151, only the budget for FRM (F3) passed the significance test (0.003). Hence the direct influencing factor of OFSI is the budget for FRM (F3). The rest of the factors i.e. status of the FRM early warning system (F4), the amount of training managers received regarding risk management (F6), the perceived importance of FRM for improving organizational behaviour (F7) may well influence the OFSI and some of these were certainly noted by respondents as being of importance, but there is no evidence of a direct causality between them.

<Table 10 near here>

To better understand how to improve the effectiveness of FRM, further analyses between the possible affecting factors of FRM and OFSI in the past 3 years were conducted respectively for companies with OFSI of 6-32 and those of 0-3. Table 11 showed that with p value of 0.017 high OFSI (low effectiveness of FRM) is correlated and caused by the managers' perceived importance of FRM for improving organizational behaviour (F7). Table 12 indicated that low OFSI (high effectiveness of FRM) is correlated to 5 factors, i.e. the level of support the managers give to FRM (F1), the changing trend of the level of support that managers give to FRM in the last 5 years (F2), the amount of training managers received regarding risk communication (F5), the amount of training managers received regarding risk management (F6), and the perceived importance of FRM for improving organizational behaviour (F7). However the regression analysis proved that the perceived importance of FRM for improving organizational behaviour (F7) is the only causing factor of the lowering OFSI ( $p=0.005$ ). With P value of 0.001 and  $R^2$  of 0.121, Table 12c further confirmed this casual relationship. It seems that the perceived importance of FRM for improving organization behaviour is the causal factor of both best and worse FRM practices. The more important it is perceived to be then the more effective are the FRM measures, and vice versa. This result explains the poor current FRM situation and manager's casual attitude to FRM in 3.1. It is not hard to understand that the more important the managers perceived FRM to be then the more financial support would be given to an FRM programme. Hence the budget for FRM (F3) is the causal factor of OFSI for all of the case study companies.

#### **4 DISCUSSIONS AND CONCLUSION**

The results of the research reported here suggest that there is indeed a relationship between CSR and a food company's risk management and among other affecting factors of the effectiveness of FRM, the budget allocated to FRM is the direct resulting factor for all case companies, and correspondingly the managers' perceived importance to FRM for improving organizational behaviour is the direct resulting factor for both low and high effectiveness of FRM. It is the first study of its type in China and throws light on an important aspect of the country's development. The case study companies are of different size, scale, ownership, and history, but they are

nonetheless broadly representative of the large diversity of Chinese food companies. Hence the research results are generalizable. However, it should be noted that the research does have some limitations. First, only company managers were interviewed, so the results may be different if other employees were included in the survey. Second, the case companies are in Henan and Wuhan, both are in central China, which could cause slight bias to the result. Understandably, apart from what has been reported here, there could be other factors such as surveyed companies' characteristics or regional characteristics etc. that could affect FRM. Thirdly, due to the nature of this research (from the manager's perspective), a more subjective approach was adopted to measure both FRM and CSR. This was adopted to allow maximum flexibility in response by the respondents. Further research could employ more concrete indicators (i.e. environmental and social indicators for CSR, and the actual spending on FRM training, full-time FRM employees, if international standard such as HACCP is adopted, etc.) to pin down both CSR and FRM.

The most important outcome of the research is that FRM is not given enough attention by Chinese food companies. Although the managers claimed to support FRM, and the majority claimed that their companies were proactive in dealing with food risks, in reality they spent little money on FRM and almost half of the surveyed companies did not have an early warning system in place; a clear requirement of FRM. Obviously many of them were not alarmed enough by the world-wide known food safety incidents that have happened in recent years to take action to enhance the FRM of their company. So the results suggest that the whole FRM situation in China remains very serious, and this echoes the work of Bai et al (2007) who, by looking at the bulletin of China's Ministry of Health (MOH) for 2003 and 2004, also concluded that China was facing a serious food safety problem.

It was also found that a food company's attitude (defensive/passive/proactive) to CSR affects its attitude to risks, and indeed the CSR performance of a company has an apparent link with the effectiveness of its FRM. With better CSR performance a company experiences less risk than the ones with less good CSR performance. So a clear linkage is shown here – food companies need to enhance their FRM to deal with the food safety problems, and with the current poor FRM situation, it is more urgent to promote FRM in food companies, and one of the important measures is to promote

CSR in these companies. This result to some extent provides the empirical evidence to the policy implications of Kong (2012)'s study that Chinese authorities should encourage firms to pursue CSR and firms would be able to gain competitive advantage in a long term by being socially responsible. This finding may not necessarily be all that surprising; one would expect a 'good' company to have a strong CSR as well as an FRM. Thus both become indicators of an underlying sense of responsibility held by the company. What is perhaps more important to understand is why that company has that sense of responsibility? What are the factors which encourage it within the Chinese context and how can they best be nurtured? Care also has to be taken, of course, in assuming that the mandatory adoption of an FRM would also encourage better CSR. It is perhaps far more likely that the adoption of CSR would provide a better facilitating environment for an FRM rather than the other way around. Thus policy could perhaps focus on a facilitation of CSR in the country rather than focus solely on adoption of FRM. Nonetheless, these points are no doubt a fruitful area for future research with the employment of more concrete indicators than used here, but establishing a positive correlation between CSR and FRM is certainly a good first step.

Other FRM affecting factors were also found, including the company's budget for FRM, the status of its early warning system, the amount of training managers received in risk management and the perceived level of importance of FRM for improving organizational behaviour. This list is perhaps an unsurprising one. However, it should be noted that only the budget for FRM is the direct influencing factor of the effectiveness of FRM. This echoes the results of Bas et al (2007) and Karaman et al (2012), who argued that cost is the one of main barriers for the implementing of an HACCP and FRM system in food companies in Turkey. There is obviously a need for more investigation regarding the cost of these interventions and how this can be addressed with support from government. Thus while training in an FRM related area, not only for the managers but also for all staff in the food producing and processing industry, would be expected to be important in terms of effectiveness of FRM this research suggests that it is not so. As mentioned by Pei et al (2011), one of the weak points of China's food safety system has often been claimed to be the lack of trained personnel, and in order to make up for this shortage the Chinese government has stated that it will endeavour to reinforce its training schemes. However, our research

indicates that there is no direct linking between OFSI and the training received by managers in risk management, especially no link at all between the OFSI and the trainings received in risk communication. The lack of statistical evidence linking trainings and OFSI is perhaps one of the most surprising outcomes of the research. The reason for this could be multiple, and one of them could be that data collected in this research regarding trainings was only the managers' self-reported training (it does not include training given to other employees), which could cause some bias. Another reason could be that the managers themselves did not realize the importance of training and it became something of a 'tick box' exercise while in fact they did not learn anything. Hence it is the quality of the training that is far more important with regard to FRM while here the respondents simply reported the quantity.

Although overall the budget seems to be the main causal factor for the effectiveness of FRM, the fundamental reason is actually the manager's perceived importance of FRM for improving organization behaviour. Both the most effective and the poorest FRM practices are the result of the managers' perceived importance of FRM for improving organizational behaviour. The more importance given to FRM by a manager then the more attention that would be given to FRM, including more resources being allocated to FRM.

Overall the results suggest that there is an ongoing and urgent need for China to strengthen its FRM and improve the food safety level. It is important not only for Chinese people but also for the rest of the world with China now being a major exporter of agricultural products. It is clearly not only a matter of creating new legislation and making sure that legislation is communicated and implemented, but getting better co-ordination between the central government and provincial government, and improving self-regulation by individual companies and the ones in their supply chains. The new food safety law of China shows a clear inclination that the Chinese government is about to embark on a major reform of its food safety regime, and it certainly is heading in the right direction. But a more systemic follow-up approach has yet to be established to ensure both the end-product test and on-site inspection are properly carried out and monitored. With a clear link between CSR and FRM, the results presented here strongly suggest that the government needs to be



more proactive in terms of promoting a sense of CSR within the food industry and their supply chains.

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Table 1 Summary of attributes of the 161 surveyed companies

Number of surveyed companies: 161					
Area	Henan Province		Wuhan City		
	126 (78%)		35 (22%)		
Found time	Before 1989 (inc.1989)	1990-1999	2000- 2005	2006- 2010	
	23 (14%)	68 (42%)	49 (30%)	21 (13%)	
Ownership	Private	Sino-foreign joint venture	Public listed	State- owned	Others
	83 (52%)	35 (22%)	19 (12%)	17 (11%)	7 (4%)
Registered capital (Million Yuan RMB)	Less than 0.5 (inc. 0.5)	0.5-1 (inc. 1)	1-5 (inc. 5)	5-10 (inc. 10)	Above 10
	33 (20%)	27 (17%)	39 (24%)	22 (14%)	40 (25%)
number of employees (person)	Less than 50 (inc.50)	51-100	101-500	501- 1000	Above 1000
	45 (28%)	21 (13%)	51 (32%)	25 (16%)	19 (12%)

Table 2 Summary of food safety risk management (FRM) and CSR indicators in a food company

FRM related indicator	CSR related indicator
<p><b>Current situation of FRM:</b></p> <ol style="list-style-type: none"> <li>1. Level of support the manager gives to FRM</li> <li>2. The changing trend of the level of support that the manager gives to FRM in the last 5 years</li> <li>3. The budget for FRM</li> <li>4. Status of the FRM early warning system</li> <li>5. Trainings managers received regarding risk communication</li> <li>6. Trainings managers received regarding risk management</li> </ol>	<p><b>Current CSR performance:</b></p> <p>Measured by respondents' perceptions regarding their companies' CSR performance</p>
<p><b>Company's attitude to risks:</b></p> <ol style="list-style-type: none"> <li>1. Defensive - taking no measures when the crisis arise</li> <li>2. Passive/reactive – taking measures during the crisis as responses to the public/media pressure</li> <li>3. Proactive – having measures in place before crisis</li> </ol>	<p><b>Attitude to CSR:</b></p> <ol style="list-style-type: none"> <li>1. Defensive – no CSR apart from profit making</li> <li>2. Passive/reactive – take when it is legally required</li> <li>3. Proactive – take as part of company strategy</li> </ol>
<p><b>Effectiveness of FRM:</b> Occurrence of food safety incidents (OFSI)</p>	

Table 3 Occurrence of food safety incident in the last 3 years

Type of incident	Number of occurrence in the last 3 years		Number of responding companies
	Maximum occurrence of the type for one company	Total occurrence of the type	
1. Product being copied by competitors	8	117	153
2. Recall	6	95	153
3. Employees being sluggish at work	5	92	152
4. Sharp reduce on profit	5	89	152
5. Resignation of senior management	4	57	154
6. Natural disaster	5	39	152
7. Impairment of brand	5	37	151
8. Loss of sensitive information	5	34	152
9. Impairment of brand (negative comments from the media)	3	33	152
10. Major lawsuit (caused by product safety issues)	3	30	152
11. Fire, blast, chemical spill etc	5	24	152
Maximum total occurrence of all incidents for one company in the last 3 years		32	

Table 4 Descriptive analysis of current situation of FRM in the case companies (the ranks are based on 1-5 scale)

	Maximum rank	Average rank	Standard deviation	Number of respondents
How alert are you to food safety issues?	5	3.64	0.91	154
Status of the early warning system	5	3.53	1.05	159
Level of support the manager gives to FRM	5	4.34	0.69	161
Changes of level of support the managers gave to FRM in the last 5 years	5	4.067	0.77	160
The amount of training managers received regarding risk communication	5	3.51	0.92	158
The amount of training managers received regarding risk management	5	3.46	0.89	158

Table 5 Spending on food risk management

	Maximum spend	Average spend	Number of companies surveyed
% of the yearly budget actually spent on FRM?	15	6.67	126
% of the early budget that you think should be spent on FRM?	20	7.88	134

Table 6 Correlation analysis between the company's attitude to CSR and to food risks

	Attitude to food risks	Attitude to CSR
Pearson correlation	1	0.328 <sup>a</sup>
N	161	154

<sup>a</sup> correlation is significant at the  $P < 0.01$  level (2-tailed).



Table 7 Regression analysis of the company's attitude to CSR and to food risks

a. Model summary

Std. Error of the Estimate	R <sup>2</sup>	Adjusted R <sup>2</sup>
0.328	0.108	0.102

b. Coefficients<sup>a</sup>

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	4.057	0.128		31.620	0.000
Attitude to CSR	0.231	0.054	0.328	4.285	0.000

Independent variable: attitude to CSR; dependent variable: attitude to food risks.

Table 8 Crosstab analysis between the occurrence of food safety incident and CSR performance

		Occurrence of food safety incident (OFSI)																				
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	17	18	19	21	32	OFSI <sup>a</sup>
CSR performance	1.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	2.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	2.5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	3
	3.0	6	2	0	2	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	14
	3.5	2	1	2	0	0	1	1	0	1	0	0	0	3	0	0	0	0	0	0	0	11
	4.0	6	4	7	2	2	2	4	2	1	1	0	1	0	1	0	0	0	1	1	0	35
	4.5	5	3	9	3	2	1	4	0	3	2	1	2	0	0	0	0	0	0	0	0	37
	5.0	17	3	4	0	4	1	2	1	1	4	1	0	1	2	0	0	0	0	0	0	41
Total		39	13	23	7	8	6	12	4	6	7	2	3	4	3	1	2	1	1	1	1	144

<sup>a</sup> the higher the mark of CSR performance the lower the CSR performance (1.0 indicates the best CSR performance while 5.0 the worst).

OFSI =  $\sum$  (number of cases/answers \* corresponding OFSI), for example, 35=1\*3+1\*15+1\*17

Table 9 Correlation analysis between effectiveness of FRM and the affecting factors

	OFSI	F1	F2	F3	F4	F5	F6	F7	F8
OFSI	1								
F1	-0.090	1							
F2	-0.036	0.548 <sup>a</sup>	1						
F3	0.214 <sup>b</sup>	0.177 <sup>b</sup>	0.198 <sup>b</sup>	1					
F4	-0.223 <sup>a</sup>	0.271 <sup>a</sup>	0.218 <sup>a</sup>	0.114	1				
F5	-0.128	0.271 <sup>a</sup>	0.340 <sup>a</sup>	0.141	0.476 <sup>a</sup>	1			
F6	-0.189 <sup>b</sup>	0.255 <sup>a</sup>	0.339 <sup>a</sup>	0.152	0.544 <sup>a</sup>	0.879 <sup>a</sup>	1		
F7	0.339 <sup>a</sup>	-0.201 <sup>b</sup>	-0.305 <sup>a</sup>	-0.069	-0.366 <sup>a</sup>	-0.270 <sup>a</sup>	-0.297 <sup>a</sup>	1	
F8	0.086	-0.131	-0.074	-0.044	-0.042	-0.138	-0.079	0.031	1

<sup>a</sup> correlation is significant at  $P < 0.01$ ;

<sup>b</sup> correlation is significant at  $P < 0.05$ ;

<sup>c</sup> OFSI is the occurrence of food safety incident, indicator of effectiveness of FRM;

<sup>d</sup> F1 is the level of support the manager gives to FRM;

<sup>e</sup> F2 is the changing trend of the level of support that the manager gives to FRM in the last 5 years;

<sup>f</sup> F3 is the budget for FRM;

<sup>g</sup> F4 is the status of the FRM early warning system;

<sup>h</sup> F5 is the amount of trainings managers received regarding risk communication;

<sup>i</sup> F6 is the amount of trainings managers received regarding risk management;

<sup>j</sup> F7 is the perceived importance of FRM for improving organizational behaviour;

<sup>k</sup> F8 is the change of profit in the previous 3 years.

Table 10 Regression analysis of OFSI and its affecting factors

a. Model summary

SE of the Estimate	R <sup>2</sup>	Adjusted R <sup>2</sup>
4.755	0.187	0.151

b. Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	SE	Beta		
(Constant)	4.505	2.894		1.556	0.122
F4	0.204	0.066	0.265	3.079	0.003
F5	-0.585	0.552	-0.113	-1.059	0.292
F7	-0.800	0.624	-0.135	-1.282	0.202
F8	1.225	0.742	0.186	1.651	0.102

Independent variable: F4, F5, F7, F8; dependent variable: OFSI.

Table 11 The correlation and regression analyses between OFSI and affecting factors for companies with OFSI of 6-32

a. Correlationship analysis

	OFSI	F1	F2	F3	F4	F5	F6	F7	F8
OFSI	1								
F1	0.063	1							
F2	0.009	0.593 <sup>a</sup>	1						
F3	-0.136	0.316 <sup>b</sup>	0.247	1					
F4	-0.029	0.231	0.014	0.292	1				
F5	0.109	0.360 <sup>a</sup>	0.302 <sup>b</sup>	0.363 <sup>b</sup>	0.423 <sup>a</sup>	1			
F6	0.045	0.317 <sup>b</sup>	0.189	0.436 <sup>a</sup>	0.533 <sup>a</sup>	0.842 <sup>a</sup>	1		
F7	0.324 <sup>b</sup>	-0.203	-0.203	-0.137	-0.131	-0.194	-0.180	1	
F8	0.190	-0.245	-0.209	-0.024	-0.167	-0.250	-0.202	0.126	1

b. Regression analysis

Model summary		
SE of the Estimate	R <sup>2</sup>	Adjusted R <sup>2</sup>
4.751	0.105	0.088

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	SE	Beta		
(Constant)	4.444	2.192		2.027	0.048
F7	2.214	0.898	0.324	2.466	0.017

Independent variable: F7; dependent variable: OFSI.

Table 12 The correlation and regression analyses between OFSI and affecting factors for companies with OFSI of 0-3

a. Correlation analysis

	OFSI	F1	F2	F3	F4	F5	F6	F7	F8
OFSI	1								
F1	-0.251 <sup>b</sup>	1							
F2	-0.294 <sup>a</sup>	0.497 <sup>a</sup>	1						
F3	0.058	0.012	0.145	1					
F4	-0.196	0.261 <sup>b</sup>	0.341 <sup>a</sup>	0.094	1				
F5	-0.226 <sup>b</sup>	0.207 <sup>b</sup>	0.414 <sup>a</sup>	0.060	0.477 <sup>a</sup>	1			
F6	-0.214 <sup>b</sup>	-0.170	0.447 <sup>a</sup>	0.051	0.519 <sup>a</sup>	0.913 <sup>a</sup>	1		
F7	0.348 <sup>a</sup>	-0.168	-0.381 <sup>a</sup>	-0.163	-0.448 <sup>a</sup>	-0.246 <sup>b</sup>	-0.301 <sup>a</sup>	1	
F8	-0.093	-0.121	-0.042	-0.196	0.002	-0.083	-0.014	-0.011	1

b. Regression analysis between OFSI and F1, F2, F5, F6, F7

Model summary		
SE of the Estimate	R <sup>2</sup>	Adjusted R <sup>2</sup>
0.989	0.203	0.153

	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	SE	Beta		
(Constant)	1.982	0.967		2.050	0.044
F1	-0.252	0.192	-0.152	-1.309	0.194
F2	-0.068	0.175	-0.052	-0.387	0.700
F5	-0.189	0.291	-0.157	-0.649	0.518
F6	0.076	0.312	0.062	0.245	0.807
F7	0.432	0.149	0.321	2.893	0.005

Independent variable: F1, F2, F5, F6, F7; dependent variable: OFSI.

c. Regression analysis between OFSI and F7

Model summary

SE of the Estimate	R <sup>2</sup>	Adjusted R <sup>2</sup>
1.005	0.121	0.111

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	SE	Beta		
(Constant)	0.089	0.284		0.315	0.754
F7	0.466	0.135	0.348	3.462	0.001

Independent variable: F7; dependent variable: OFSI.

