



**Analysis of the Regulatory Regime for Controlling Risks  
Related to the Canadian Food Supply Chain**

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December 20, 2014

## **Acknowledgements**

This paper is the result of a research project on critical infrastructure protection that started in 2008. We have conducted research on the transportation, manufacturing (dangerous chemicals) and agricultural sectors. The authors wish to acknowledge the support of the Social Sciences and Humanities Research Council (Standard Operating Grant No. 410-2008-1357; Partnership Development Grant No. 890-2010-0123), Public Safety Canada and the Kanishka Project Contribution Program. The views expressed in this paper do not necessarily reflect the views of the Government of Canada.

Special thanks also go to the 81 interview subjects (13 of whom were interviewed for this paper) from four countries who graciously gave their time in support of this research. We would also like to acknowledge the several students at Dalhousie University who have assisted in this research since its inception.

Janet Lord copyedited this document and Mariette-Linda Benoît translated the Executive Summary.

While we are grateful for the support from these sources, the authors alone are responsible for any errors or omissions.

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## List of Abbreviations

<b>AAFC</b>	Agriculture and Agri-Food Canada
<b>ATQ</b>	Agri-Traçabilité Québec
<b>BSE</b>	Bovine spongiform encephalopathy
<b>CCIA</b>	Canadian Cattle Identification Agency
<b>CFIA</b>	Canadian Food Inspection Agency
<b>CIP</b>	Critical infrastructure protection
<b>COOL</b>	Country-of-origin labelling
<b>CVS</b>	Compliance Verification System
<b>DFATD</b>	Foreign Affairs, Trade and Development Canada
<b>FDA</b>	United States Food and Drug Administration
<b>GATT</b>	General Agreement on Tariffs and Trade
<b>GPS</b>	Global positioning system
<b>HACCP</b>	Hazard analysis and critical control points
<b>IGH</b>	Interest Group Hypothesis
<b>MAFF</b>	UK Ministry of Agriculture, Fisheries and Food
<b>MFH</b>	Market Failure Hypothesis
<b>NAFTA</b>	North American Free Trade Agreement
<b>OFFS</b>	On-Farm Food Safety
<b>ORH</b>	Opinion-Responsive Hypothesis
<b>RFID</b>	Radio-frequency identification
<b>SFCA</b>	<i>Safe Food for Canadians Act</i>
<b>SPS</b>	Sanitary and phytosanitary
<b>VCRT</b>	Value Chain Roundtable
<b>WTO</b>	World Trade Organization

## 1. Executive Summary

This paper reports on the results of a research project designed to identify how Canada regulates risks associated with low-probability/high-consequence events involving the food supply chain, and the contextual factors that influence this risk regulation. In referring to the food supply chain, we mean “the physical and information systems and processes” employed to deliver food products or services “from one location or entity to another” (Australia. Department of Agriculture, Fisheries and Forestry, 2012: vi). It encompasses the whole range of organizations and individuals involved in the production, distribution and use of food, from primary producers to consumers (Canada. Standing Committee on Agriculture and Agri-Food, 2013). Other terms for this are “food system” (see National Center for Food Protection and Defense, 2005) and “food distribution chain” (see Agriculture and Agri-Food Canada, 2009). Risks to the supply chain threaten the quality and accessibility of food in Canada. The control mechanism in question includes the various public and private mechanisms designed to regulate these risks, and to ensure access to food in the event of a disaster.

Our analysis of the food supply chain focuses primarily on food supply emergencies, or acute crises that present immediate risks to Canadians. These risks can manifest in various ways, including in unintentional food safety contaminations such as the 2008 listeriosis outbreak (see Agriculture and Agri-Food Canada, 2009), as security threats stemming from the intentional contamination of the supply chain by malicious actors, and as major disruptions to supply chain infrastructure due to human or natural events, such as a natural disaster.

Our definition of food supply emergency includes terrorism, an uncertain risk (Renn, 2008). There are insufficient data about the risk of terrorism to build a robust risk-modelling framework. A prominent feature of our literature review is the absence of either planned or executed terrorism-related violence against the Canadian food supply chain. Instead, the regime is in many ways focused on food safety risks, such as food-borne illnesses, and our analysis reflects this focus. We are confident that our findings will nevertheless be of interest to readers interested in terrorism in the context of Canada’s food supply. This is because, in the event of a terrorist attack, the regime’s various safety mechanisms would be at the forefront of detecting and mitigating its effects. Traceability systems, recalls and other tools are critical for responding to both accidental and intentional contamination. Moreover, many of the contextual factors that shape the food safety regime – such as market factors, public opinion and the distribution of interest group capabilities – would likely have similar effects in the aftermath of a terrorist attack.

Finally, note that the focus of this paper is the regulatory regime in place to prevent terrorist attacks and other food supply emergencies. Hood, Rothstein and Baldwin define regime as “the complex of institutional geography, rules, practice and animating ideas that are associated with the regulation of a particular risk or hazard” (2001: 9). In general, we do not discuss specific plans or processes for responding to crises involving the food supply; the paper is not intended to provide detailed emergency management guidelines

or comment on such guidelines. Rather, it should be read as an account of the regulatory regime that controls risks associated with the food supply chain before they manifest as emergencies.

### **1.1. Methodology**

We employ the Hood *et al.* (2001) meso-level risk regulation regime framework to guide our analysis. Our data were gathered between 2011 and 2014 as part of a major research project on critical infrastructure protection, which included 81 semi-structured interviews with critical infrastructure owners and operators, a media analysis of 24 post-9/11 critical infrastructure events and an extensive literature review. Of our 81 interviews, 13 were with individuals employed by or otherwise involved with various institutions implicated in the food supply chain, including regulatory agencies, commodity associations, grocery chains, non-profit food banks and academia. Most interview subjects worked for Canadian organizations, although we also interviewed specialists from the UK and Australia to provide some comparative perspective (see Appendix A for a full list of interview participants). Throughout the paper, we use the acronym FI along with a number to refer to evidence gathered from an interview participant. The interview tool and process were approved by Dalhousie University's Research Ethics Board. Our media analysis included two food-related events: the 2008 Maple Leaf Foods listeriosis outbreak and the 2006 *E. coli* outbreak in spinach. For a more detailed description of our methodology, please see Appendix B.

### **1.2. Limitations**

As with all social science work, our research must be considered in light of certain methodological limitations. Our findings reflect the knowledge and perceptions of a small group of highly qualified interview participants at a specific moment in time. Our literature review was restricted to information available in the public domain. Our interpretation of these data reflects the analytical model (the Hood *et al.* framework) that we employed to draw observations from the interview transcripts. Our objective is not to provide an exhaustive account of safety and security regulation in the context of the Canadian food supply chain, but rather to contribute to a deeper understanding of specific issues with respect to food supply emergency risk perception and management. Above all, our analysis suggests that further research in the area of food supply risks and risk governance – a broad and complex subject – is warranted.

### **1.3. What We Found**

A key feature of the Canadian food supply chain is its complexity. The chain comprises a wide range of actors, including food producers, processors, distributors and retailers, as well as restaurants and consumers. Given its regulatory role, government can also be included in this list. These actors vary along numerous dimensions. Beyond functional differences, they also differ with respect to size and location. The food supply chain operates at numerous scales, from the local to the global. The purchase by a southern Ontario resident of locally grown fruit at a farmers' market and the import by a major

grocery chain of Vietnamese fruit into Canada are both examples of transactions within the food supply chain.

One way of categorizing the supply chain is to consider its distinct commodity value chains (beef, pork, grains, etc.). A related term for this concept is value chain. It acknowledges that commodities tend to go through separate processes, starting with inputs to producers and continuing to retail of the product, before reaching consumers.

A widely reported trend is the continued consolidation of the food supply chain (Sparling *et al.*, 2005). This is driven to some extent by multinational grocery firms, whose size has enabled them to influence the behaviour of their suppliers. Thus, although the chain retains separate commodity chains, overall it is exhibiting greater centralization and rationalization. Today, the chain is a tightly coupled, interconnected system with changes in one sector or location often producing extensive repercussions.

In Canada, regulatory authority with respect to food is divided between the federal and provincial orders of government. The regulatory regime is thus characterized by a degree of jurisdictional complexity. Adding to this complexity is the increasing prevalence of international standards promulgated through bilateral free trade agreements as well as the broader multilateral trade regime, including the World Trade Organization (WTO) and its associated institutions. Also influential are private standards, adherence to which is increasingly a minimum *de facto* condition for participating in the market.

At the macro level, the Canadian food supply chain is thus subject to a dense web of public and private regulation. In addition, there is pressure from both domestic and international sources to achieve standardization across these regulatory schemes. This is driven to some extent by a desire to maintain access to markets such as the United States and the European Union, which have extensive regimes of their own. Despite this pressure, the Canadian regulatory regime should not be described as a single, coherent system. Instead, it is more accurate to think of it as an amalgamation of separate mechanisms that exhibit varying degrees of alignment.

Our findings are organized according to the structure of the Hood *et al.* framework. This model considers the content and context of a risk regulation regime. The former concept – content – builds on the cybernetic theory of control to examine the management of a specific policy area. It asserts that the three dimensions of control – information gathering, standard setting and behaviour modification – must be present in order for the entire system to be under control. The latter concept – context – refers to three factors that typically shape regime context: the technical nature of the risk (Market Failure Hypothesis), the public's and media's opinions about the risk (opinion-responsive hypothesis) and the way power and influence are concentrated (interest group hypothesis).

### 1.3.1. Regime Content

#### *Information Gathering*

Information gathering represents the largest and most aggressive component of the Canadian regulatory regime. It comprises a mix of horizontal and vertical mechanisms, which range from information-sharing forums to formal inspections. Horizontal information sharing, including through multi-organizational forums such as the Canadian Federation of Agriculture, is generally viewed in favourable terms by industry participants. They see the forums as opportunities to establish and enhance trust between industry and government officials, to facilitate regular and precise information sharing between industry and emergency managers and, for small organizations such as provincial industry associations, to leverage the information-gathering capacity of larger organizations, such as national associations. In the case of vertical information sharing, through Value Chain Roundtables (VCRTs) and other mechanisms, transparency appears to be hindered by the highly competitive nature of the food industry. Traceability, which refers to the collection of data about a product as it moves through the supply chain, has become a key objective for industry. The technical sophistication of traceability systems continues to improve, enhancing the quality of data available to industry and regulators. Traceability requirements, however, vary by province, and in many cases traceability systems remain voluntary, in some cases due to resistance to mandatory programs by industry. Provincial and federal regulatory agencies also gather information through inspections, which are conducted according to risk-based assessments. The emphasis on implementing robust information gathering and sharing mechanisms follows several high-profile food safety incidents, including the bovine spongiform encephalopathy (BSE) and avian flu incidents and the Maple Leaf and XL Foods recalls (Ward, 2014). The Weatherill Report on the 2008 listeriosis outbreak, for example, identified significant problems with inter-departmental information sharing and coordination. Meanwhile, information sharing on non-safety hazards, such as security and emergency management planning, is minimal.

#### *Standard Setting*

Standards for the food supply chain are rule-oriented, extensive and aggressive, and emanate from both public statutes and private codes of practice. As noted above, government responsibility for the food supply chain is split between Ottawa and the provinces. At the federal level, the development of standards is led by Health Canada. There appears to be general agreement about the stringency of these standards in areas such as food disposal, distribution, importing and processing. The line between public and private regulation is becoming increasingly blurred, and some private programs have been integrated into government standards. In other cases, government relies on private programs to achieve food safety objectives, as in the case of On-Farm Food Safety (OFFS) programs in Alberta. International factors, such as trade liberalization under the WTO and the consolidation of retailers, serve as a key influence on standards. Major retailers, in particular, wield significant buying power and are able to impose their preferred standards on suppliers. As with information sharing, most standards address

food safety; there are fewer on security, business continuity and emergency management. Security, for instance, remains largely the purview of individual firms. Similarly, our interview data and literature review suggest limited awareness of the interdependencies among critical infrastructure sectors. Standards are focussed on maintaining the quality and integrity of food, and less so on ensuring access to transportation, energy and other critical services in the event of an emergency.

### *Behaviour Modification*

Behaviour modification is conducted through a mix of public and private mechanisms. The Canadian Food Inspection Agency (CFIA) possesses a variety of enforcement tools, including the authority to issue warnings, suspend or cancel licences and refuse entry into Canada of food shipments. The Weatherill Report noted several deficiencies with CFIA enforcement practices, due in large part to poor implementation of the Agency's new Compliance Verification System (CVS). Many of these issues are addressed in the *Safe Food for Canadians Act*, which enters into force in 2015 (although the efficacy of these new measures remains to be seen). For private standards, enforcement is provided by third-party certification organizations that conduct inspections and verify compliance. The integration of private standards into public statutes means government inspections often serve as a compliance mechanism for both types of standards. When a food risk to human health is identified, a recall may be initiated. Since 2006, there have been 200 to 300 food recalls each year in Canada (Auditor General of Canada, 2013).<sup>1</sup> A recent Auditor General report concludes that the first stages of the recall process are working well but that decision-making procedures are not well understood and follow-up activities require improvement. In addition to enforcing standards, behaviour modification in the food supply chain includes government efforts to affect consumer behaviour, for example with respect to properly cooking meat. Consumer knowledge and behaviour appear to vary across commodity types. Those who lack food preparation skills tend to be disproportionately affected by food supply disruptions.

#### 1.3.2. Regime Context

##### *Markets*

Comprising a wide and diverse range of economic activities, the food supply chain presents high information costs and both high and low opt-out costs. High information costs stem from the impracticality for consumers of obtaining accurate information about distantly sourced food, as well as the absence of reliable data about certain low-probability risks. These risks similarly present high opt-out costs, because they hold the potential to cause large-scale disruptions to the distribution of food. On the other hand, consumers hold significant power through the market over individual food commodities

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<sup>1</sup> Recalls are 'voluntary': after receiving data that a product is contaminated, the CFIA *recommends* to a firm that it initiates a recall. Once the firm makes this decision it cannot change it; CFIA becomes responsible for ensuring the recall is conducted properly. If the firm chooses not to do a voluntary recall after CFIA's recommendation, then CFIA can issue a mandatory recall.

<sup>2</sup> In addition, it is likely more difficult for government to compensate the tourism industry than the agriculture industry given the challenge of determining how many foreign visitors chose not to visit

and brands. Opt-out costs, in other words, are low because of the substitutability of most food products. In light of these dynamics, the Market Failure Hypothesis (MFH) appears to offer a strong account of government efforts to implement information gathering and dissemination processes, including robust traceability mechanisms. The efficacy of existing market and civil law processes for dealing with some opt-out costs also helps explain the prevalence of private rather than government food safety standards. The competitiveness of the market may limit the potential for private sector collaboration in the event of an emergency, since the substitutability of food products means that when one brand or commodity suffers, others profit. MFH is less convincing in accounting for the relative absence of regulatory attention towards low-probability/high-consequence risks, for which there are few market or legal options for reducing opt-out costs.

### *Media and Public Opinion*

The Opinion-Responsive Hypothesis (ORH) emphasizes how public attitudes about the safety and security of the food supply chain are informed by psychological assessments of food-related risks. The academic literature suggests that consumers often adopt an irrational perspective toward certain risks, focussing disproportionately on hazards related to contamination and the application of technology to food production. Although these types of hazards are potentially harmful, the probability of being affected by them is relatively low, particularly compared to risks related to the habitual consumption of unhealthy food. ORH is useful in this respect because it explains government attention to traceability systems, which are intended to help address food safety and contamination issues. MFH and ORH are thus complementary, because heightened public concern is often directly manifested in the market when consumers choose not to purchase commodities or brands that are perceived as unsafe. ORH is additionally complementary because it offers insight into the absence of regulatory attention toward food security hazards: the absence in Canada of malicious attacks against the food supply explains the low attention paid to preparing for this risk. This is similarly the case for natural disasters that disrupt the distribution of food. As well, ORH highlights why some societies appear to have higher risk tolerances in the case of culturally significant food products (French cheese prepared with unpasteurized milk, for example). Although Canada experiences 200 to 300 food recalls per year, most of these receive relatively little media attention. Occasionally, however, they generate large volumes of coverage, particularly when they tap into psychological and social fears about disease, the application of technology to food production or the effects of hormones, pesticides, antibiotics and genetic modification. Our media analysis suggests that food safety emergencies tend to produce media coverage whose treatment of government is either ambivalent or, where there is perceived conflict between jurisdictions or departments, critical. In addition to being difficult to predict, media coverage can be highly disruptive. Negative coverage can cast doubt on the quality of a commodity or brand, which can translate into significant financial losses for industry and the broader economy, as Canada experienced during the 2003 BSE outbreak.

## *Interests*

The Interest Group Hypothesis (IGH) draws our attention to the structure and arrangement of interest groups in Canada and the manner in which they have been affected by the globalization of the food supply chain, the liberalization of international trade and the country's political and economic institutions. The food supply chain contains a diverse range of interest groups, with no overarching industry association capable of maintaining a corporatist relationship with government, at least at the national level. The food supply chain is also increasingly oriented toward external actors and conditions. Although always reliant on exports, Canada's agricultural producers are today integrated into global vertical supply chains to an unprecedented degree. External actors, including multinational corporations and free trade instruments, therefore have a significant impact on the Canadian regulatory regime. Their prominence explains the widespread adoption of private standards, which are often seen as minimum requirements of doing business in foreign markets. As well, the importance of maintaining access to these markets provides further insight into the Canadian regulatory regime's focus on safety rather than security, because the former could jeopardize the viability of Canadian commodities or brands over the long-term, whereas the latter may only cause a temporary disruption in Canadian exports. Indeed, our interview data and literature review emphasized the importance of maintaining access to the U.S. market. The fragmented nature of domestic interest groups also underscores the competitiveness of the food sector, as well as the challenges facing government in facilitating sector-wide consensus, including for example on the direction of Canadian trade policy. At the same time, the globalization of the food supply chain has corresponded with a transfer of power to the global level, which arguably reduces the latitude of governments in Canada to influence the overall regime.

### 1.3.3. Summary of Key Themes

The salient points highlighted by our analysis can be organized into themes. In particular, there are two overarching themes that persist throughout our interview data and literature review. The first theme deals with the increasing importance of markets and competition as organizing principles for the regime. The second theme underscores the interdependencies between the food supply chain and other critical infrastructure sectors.

In terms of the first theme, it is evident from the preceding section that the safety and security regime for the Canadian food supply chain is shifting towards a more market-based dynamic. Perhaps more than ever before, regulatory decisions are made on the basis of improving the competitiveness and efficiency of Canadian industry and promoting international trade. Our interview participants, for example, were emphatic about the overriding importance of ensuring continued access to the U.S. market for Canadian exports. The integration of Canadian agricultural products into extended, global supply chains requires that firms adopt buyers' preferred standards or be denied access to major retailers. In addition, expansion of the rules-based global trade regime provides

benefits to Canadian exporters and consumers in the form of lower prices and greater product variety, but it reduces the regulatory latitude of the Canadian government.

The competitive dynamic is promoted by the inherent structure of the supply chain. The substitutability of food products serves as a form of redundancy, which improves the resilience of the overall chain. Yet it also means that when one commodity or brand is thought to be unsafe, other commodities or brands benefit. As well, the nature of public opinion in the context of food means that firms are reliant on public confidence in the integrity of their products and the perceived quality of their brand.

The second theme underscores the extent to which the food supply chain is implicated in a broader network of critical infrastructure sectors. These sectors include transportation, energy, finance, water, government services and others, all of which are necessary for the proper functioning of the food supply chain. These interdependencies also extend to non-critical infrastructure, such as the tourism industry, which are often negatively affected by food safety emergencies. Our data, however, suggest that this fact is underappreciated by the food sector. Instead, the food supply chain appears to focus largely on the food sector in isolation. Information-sharing forums rarely include actors not directly involved in the production, distribution, sale or regulation of food products. Transportation organizations are occasionally involved in these forums, but rarely is there participation by organizations from other critical infrastructure sectors such as energy or finance. This theme also touches on issues related to the increasing centralization of the food supply chain and the concurrent proliferation of single points of failure, as well as the continued urbanization of the Canadian population, which presents new challenges due to food storage capacity issues and the lack of basic food preparation skills.

#### 1.3.4. Implications for Emergency Management

There are few instances in recent Canadian history of major disruptions to the food supply. There are therefore limited examples of how the food supply regulatory regime behaves during low-probability/high-consequence events. This may help explain the regime's emphasis on food safety failures (which tend to affect specific commodities but not the entire chain) rather than risks such as natural disasters. In the psychology literature this idea is known as the availability heuristic, which suggests that one's assessment of a risk is influenced by the ease with which one can recall relevant instances of that risk. In other words, because there have been few cases in recent memory of sudden and large-scale interruptions in the accessibility of food, the regime is not motivated to devote resources to preparing for such an event in the future.

#### *Market Dynamics*

Still, in light of the themes discussed above, it is possible to draw conclusions about the vulnerability of the food supply to low-consequence/high-probability events. We can also extrapolate about the regime's potential resilience to these events. One way to do so is to examine the types of behaviour incentivized by the regime's dynamics.

The shift towards a market orientation clearly incentivizes actors in the food supply chain, including regulators, to prioritize financial objectives. Of course, the food industry has always been motivated by profit. What has changed is the extent to which the broader regulatory regime is re-aligning to facilitate competition. A market-based orientation discourages firms from revealing information about their potential vulnerabilities. It incentivizes non-disclosure of information to government because there is a concern that this information could be shared with competitors, or if released to the markets, could cause a drop in share value or profit. When potential food safety issues are discovered, firms may wish to suppress details of the event – the “shoot, shovel, and shut-up” approach favoured by former Alberta Premier Ralph Klein (Rossiter, 2011: 114) – rather than report it to government.

From an emergency management perspective this is problematic because vulnerabilities present in one firm may be present elsewhere. By concealing their vulnerabilities, firms prevent the potential identification of sector-wide vulnerabilities, which in turn could contribute to much larger problems than one firm might realize. At the same time, a market orientation undermines the willingness of competitors to collaborate given the aforementioned financial gains enjoyed by commodities and brands when their substitutes are affected by safety or security emergencies. Similarly, despite a sometimes-held view that retailers will give away food at no cost during a crisis, there is nothing to compel retailers to do so. Finally, the reduced scope for regulatory flexibility created by Canada’s numerous international obligations and its extensive domestic food safety regime could limit the capacity for government or other actors to access or distribute food in an emergency. In Australia, for example, regulatory requirements for trucking licenses and retail hours slowed government’s response to the 2010-2011 Queensland floods (Australia. Department of Agriculture, Fisheries and Forestry, 2012: xii).

In general, market dynamics promote a rational approach to trust, in which the potential to build trust exists when actors share the same interests. Markets are therefore effective organizing mechanisms when both government and industry are pursuing similar objectives, such as convincing consumers of the quality and safety of Canadian agricultural products. When there is competition, however, trust is more difficult to establish. In this way, government’s promotion of competition in the food supply chain creates vulnerability. It also creates a challenge for the National Strategy for Critical Infrastructure’s goal of building partnerships between government and critical infrastructure owners and operators. By facilitating a more competitive environment, the current regulatory approach to food safety and security is potentially constraining the trust and collaboration that the National Strategy advocates.

#### *Limited Awareness of Interdependencies*

The interdependence of the food supply chain, as well as the relative lack of attention to this subject within the chain itself, creates a second set of vulnerabilities. As noted above, many of these vulnerabilities relate to the long supply chains that increasingly characterize the global food system. These chains involve transportation, energy, information and communication technology (IT, or cyber), water supply and finance, as

well as other sectors. The sector is reliant on labour and fuel, and is therefore vulnerable to shortages of both. A disruption in one sector could easily spill over into the food sector. A terrorist attack against a major piece of transportation infrastructure has the potential to be as disruptive (in terms of food accessibility) as an intentional food contamination.

Moreover, a single disaster can have a cascade effect, causing failures in other sectors. For example, in addition to affecting the food supply, a natural disaster could lead to labour or fuel shortages, which in turn could exacerbate food shortages. In this way, the initial failure is made worse by subsequent related failures.

Given the importance of public opinion, a related concern is the amplifying effect of social media. This feature makes it difficult for government and industry to control a story once it has started. Thus, even though a food safety risk may be unlikely to have a devastating impact on the food supply in rational terms, its potential to change consumer behaviour could in fact cause major losses to Canadian firms.

There are also vulnerabilities associated with the increasing urbanization of the Canadian population, particularly given its implications for food storage space and food preparation skills. The overall accessibility of nutritious food depends not only on the physical integrity of the food supply chain, but also on the ability of individuals to store fresh food and prepare it safely. As well, the perceived quality of Canadian food has implications for other sectors of the economy. Britain experienced the negative effects of this interdependency in 2001, when its rural tourism industry – which is closely linked to agriculture – lost an estimated £100 million a week in the immediate aftermath of the foot-and-mouth outbreak (Mosely, 2001).<sup>2</sup>

According to Renn (2008), low-probability/high-consequence events are uncertain risks. For these risks there are insufficient data to make anything beyond a fuzzy estimate of the probability that the risk event will occur. For uncertain risks, causal agents are identifiable but their manifestation is rare and unpredictable. Absorbing these risks requires enhancing a system's capacity for resilience, which in turn means reducing its catastrophic potential (even in the absence of concrete threats), introducing flexibility and improving emergency management procedures (Renn, 2008: 46). As well, it is important that risk assessments include input from a wide range of experts and stakeholders, and that decisions about the level of acceptable risk emerge from open and reflective discussion and, where possible, consensus among participants. As Renn notes, this can take different forms: "round tables, open space forums, negotiated rule-making exercises, mediation or mixed advisory committees including scientists and stakeholders" (2008: 52). Although these types of forums are prevalent on issues related to food safety, they appear to be less common with respect to low-probability/high-consequence risks.

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<sup>2</sup> In addition, it is likely more difficult for government to compensate the tourism industry than the agriculture industry given the challenge of determining how many foreign visitors chose not to visit compared to the relatively straightforward transaction of paying farmers to destroy infected livestock.

## 1.4. What We Recommend

### *Market Dynamics*

- Incentivize collaboration between firms and also between the private sector and government. Given the export-oriented nature of the industry, this could take the form of emphasizing the importance of maintaining the perceived quality of Canadian products. Highlight the risks to all sectors of Canada being viewed in foreign markets as a source of unsafe food.
- Recognize that trust in a market-based, highly competitive context is highly constrained, and these constraints are likely to increase in time as global forces make markets more competitive. Interpersonal trust is only one form of trust; focus on building confidence in standards, in safety and security processes and in the efficacy and fairness of enforcement mechanisms. Foster credibility by highlighting the regime's capacity for ensuring the safety and security of the food supply, including through penalization when regime standards are not met. Building trust in standards as opposed to between individuals or organizations can provide benefits to industry as well, for example by improving the perceived quality of Canadian products in foreign markets.
- Consider context when evaluating information-sharing forums. In a competitive environment, it is unlikely that firms will willingly disclose information about vulnerabilities in forums that include participation by competitors. To address these incentives, consider non-disclosure agreements, scrubbing identifying data before sharing information with other firms or presenting generic best practices and lessons identified as opposed to specific case studies. As well, continue to gather information through alternative means, such as inspections or audits, and learn from other countries and sectors when low-probability events occur (Australian floods in 2010-11, for example).
- Clarify expectations about the role of grocery stores, food banks and other retailers regarding food provision and compensation during emergencies. Despite the assumption that grocery stores would distribute food freely, market imperatives, supply chain logistics and potential legal issues mean that some firms, particularly large retailers, might simply stop operating in a crisis.

### *Interdependencies*

- Improve awareness of critical infrastructure interdependencies between the food supply chain and other sectors such as transportation, water, energy, finance and IT. Encourage multi-sector scenario planning to build capacity for collaboration in the event of a major disruption to the food supply chain. Facilitate information-sharing forums that include participation by organizations in other sectors, and which promote consideration of a wide range of views.
- Leverage commonly accepted safety practices and infrastructure to encourage more effective security practices.
- Promote business continuity planning for natural disasters and other hazards that could significantly affect the supply chain and the availability of food. Identify

potential single points of failure and analyze how single events could cause failures in multiple interdependent sectors.

- To help develop a security culture among industry, request participation by RCMP, Public Safety Canada, provincial law enforcement and public safety agencies in food supply forums.
- Continue advancing efforts with the provinces to establish an emergency management framework. Plans frequently do not get approved until there is a shock to the system; for example, the National Strategy for Critical Infrastructure did not receive Cabinet approval until after there was an audit of the Department. The risk in relying on external shocks to move forward regulatory policy is that the shock could be a real event (as opposed to an audit), in which case government would not have a process and plan in place to deal with it. Unplanned multi-level coordination can be susceptible to higher coordination costs but also conflict between agencies, which will be amplified by the media. Attempts to bring together multiple stakeholders, including different levels of government, often become stalled at the information-sharing stage without moving on to implementing standards and modifying behaviour; only once all three components are in place is a system under control.

#### *Other Recommendations*

- Explore options for temporarily suspending regulatory requirements during emergencies in order to acquire and distribute food as necessary. Identify regulatory barriers to effective coordination during an emergency and work to reduce them or at least develop the capacity to work around them during an event. This includes scanning other policy areas and critical infrastructure sectors, such as transportation, banking and energy, for possible regulatory impediments.
- Given public concern over food safety – which often reflects an emotive or psychometric character, as opposed to a rational one – ensure response to food safety emergencies is communicated to the public in a clear and timely manner. This means stressing containment, control and high standards. Address potential for jurisdictional conflict by identifying responsibilities at provincial and federal levels. Prepare communication strategies to address the amplifying effect of social media.
- In responding to food supply chain disruptions, emergency management offices and first responders should be prepared to assist individuals who may lack food preparation skills. Partner with provinces to promote knowledge of basic food preparation skills and storage practices in schools.

## 2. Résumé exécutif

Le présent article traite des résultats obtenus d'un projet de recherche conçu pour déterminer la manière dont le Canada réglemente les risques associés aux activités de faibles probabilités ou de conséquences élevées touchant la chaîne d'approvisionnement alimentaire ainsi que les facteurs contextuels qui influencent la réglementation fondée sur les risques. On peut définir la chaîne d'approvisionnement alimentaire comme l'ensemble des « systèmes et des processus physiques et informatiques » appliqués pour déplacer les produits et services alimentaires « d'une installation ou d'un endroit à un autre » (Australia. Department of Agriculture, Fisheries and Forestry, 2012 : vi) [ministère de l'Agriculture, des Pêches et des Forêts de l'Australie]. Cette chaîne d'approvisionnement alimentaire englobe la gamme totale des organismes et des particuliers qui participent à la production, à la distribution et à l'utilisation des aliments, depuis les producteurs primaires jusqu'au consommateur (Comité de l'agriculture et de l'agroalimentaire Canada, 2013). Parmi d'autres termes courants, on retrouve les suivants : « système alimentaire » (National Center for Food Protection and Defense, 2005) et « chaîne de distribution alimentaire » (Agriculture et Agroalimentaire Canada, 2009). Les risques associés à la chaîne d'approvisionnement menacent la qualité des aliments au Canada et leur accessibilité. Le mécanisme de contrôle en question comprend les diverses mesures élaborées par les secteurs public et privé conçues en vue de réglementer ces risques et de veiller à ce qu'on puisse accéder à des aliments en cas de désastre.

Notre analyse de la chaîne d'approvisionnement alimentaire est axée principalement sur les situations d'urgence en matière d'approvisionnement alimentaire et les crises aiguës qui comportent des risques imminents pour les Canadiens. Ces risques peuvent se manifester de diverses façons, p. ex., les cas d'atteinte à la sécurité alimentaire par la contamination involontaire, tels que l'éruption de la listériose en 2008 (Agriculture et Agroalimentaire Canada, 2009), les menaces à la sécurité au moyen de la contamination intentionnelle de la chaîne d'approvisionnement effectuée par des acteurs malicieux, et la perturbation majeure de la chaîne d'approvisionnement liée à des circonstances humaines ou naturelles, comme dans le cas d'un désastre naturel.

Notre définition d'un cas d'urgence lié à la chaîne d'approvisionnement comprend les actes de terrorisme qui représentent un risque incertain (Renn, 2008). Il est impossible d'établir un cadre de référence conceptuel solide sur les risques associés au terrorisme puisque nous possédons insuffisamment de données sur ceux-ci. Une étude de la documentation soulève une caractéristique marquante, à savoir l'absence de violence liée aux activités terroristes dirigées contre la chaîne d'approvisionnement canadienne, soit au stade de planification ou d'exécution. Au contraire, le régime est plutôt axé sur les risques liés à la sécurité des aliments, tels que les maladies d'origine alimentaire. Notre analyse reflète donc cette priorité. Toutefois, nous avons confiance que nos résultats attireront l'intérêt des lecteurs qui se penchent sur le terrorisme dans le contexte de la chaîne d'approvisionnement canadienne, parce que, dans le cas d'une attaque terroriste, les divers mécanismes de sécurité élaborés par le régime seraient placés en première ligne pour détecter et atténuer les répercussions. Les systèmes de traçabilité et de rappel ainsi que d'autres outils connexes sont primordiaux afin de répondre aux cas de contamination

accidentelle ou intentionnelle. En outre, de nombreux facteurs contextuels qui forment le régime de la sécurité alimentaire, tels que les marchés, l'opinion publique et les capacités de distribution par les groupes d'intervenants, produiraient probablement des effets similaires à la suite d'une attaque terroriste.

En dernier lieu, il importe de noter que cet article est axé sur le régime réglementaire en vigueur dont l'objectif consiste à empêcher les attaques terroristes et autres cas d'urgence liés à l'approvisionnement alimentaire. Hood et collaborateurs définissent le régime comme « l'ensemble de la géographie institutionnelle, des règles, des pratiques et des idées concrètes associées à la réglementation d'un risque ou d'un danger particulier » (2001 : 9). En général, nous évitons de mentionner les projets et les processus particuliers qui visent à maîtriser les crises touchant l'approvisionnement alimentaire; l'objectif de cet article ne consiste pas à déterminer les lignes directrices détaillées en matière de gestion des urgences ni de se prononcer sur celles-ci. Plutôt, ce dernier doit se lire à titre de compte rendu d'un régime réglementaire qui maîtrise les risques associés à la chaîne d'approvisionnement alimentaire avant qu'un cas d'urgence ne survienne.

## **2.1. Méthodologie**

Pour effectuer notre analyse, nous nous sommes appuyés sur le cadre de référence du régime de réglementation des risques de niveau moyen conçu par Hood, Rothstein et Baldwin (2001). La collecte de données s'est poursuivie entre 2011 et 2014, au chapitre d'un projet de recherche d'importance majeure sur la protection des infrastructures capitales. Quarante-et-une entrevues moyennement structurées ont été menées auprès de propriétaires et d'exploitants d'infrastructures capitales; une analyse des médias a été effectuée au sujet de situations critiques impliquant des infrastructures qui se sont produites à la suite des événements du 11 septembre 2001; et une étude exhaustive de la documentation a été entreprise. Parmi ces 81 entrevues, 13 personnes interrogées étaient à l'emploi de divers établissements du domaine de la chaîne d'approvisionnement alimentaire, ou y étaient étroitement liées. Parmi ceux-ci on peut compter les agences réglementaires, les associations du domaine des denrées, les chaînes d'épicerie, les banques alimentaires à but non lucratif et le monde universitaire. La majorité des participants travaillait pour des organisations canadiennes, quoique nous ayons également réalisé des entrevues avec des spécialistes provenant du Royaume-Uni et de l'Australie pour obtenir des perspectives comparatives (on peut consulter la liste intégrale des participants aux entrevues à l'Annexe A). Cet article a souvent recours à l'acronyme « FI » accompagné d'un chiffre qui se rapporte aux données recueillies auprès d'un participant à l'entretien. Le Conseil d'éthique en recherche de l'Université Dalhousie a autorisé l'application d'outils et de procédures pour faciliter les entrevues. L'analyse des médias comprend deux événements liés à l'alimentation, soit l'écllosion de la listériose au sein de l'entreprise Maple Leaf en 2008 et l'écllosion de la bactérie E. coli dans les épinards en 2006. Pour obtenir des renseignements détaillés sur notre méthodologie, veuillez consulter l'Annexe B.

## 2.2. Limitations

Comme dans le cas de tous les travaux de nature scientifique, notre recherche doit être considérée à la lumière de certaines limites méthodologiques. Nos résultats reflètent les connaissances et les perceptions d'un groupe restreint de participants hautement compétents qui ont assisté aux entrevues au cours d'une période déterminée. L'étude de la documentation ne visait que l'information disponible dans le domaine public. Nous avons interprété ces données en fonction d'un modèle analytique (le cadre de référence établi par Hood et coll.) selon les observations constatées dans les transcriptions d'entrevues. L'objectif ne consiste pas à établir un compte rendu exhaustif de la réglementation sur la sécurité et la sûreté dans le contexte de la chaîne d'approvisionnement alimentaire canadienne, mais plutôt de contribuer à une plus profonde compréhension des enjeux particuliers qui touchent la perception et la gestion des risques en cas d'urgence en matière d'approvisionnement alimentaire. Surtout, notre analyse démontre que des études approfondies sont nécessaires au chapitre des risques liés à l'approvisionnement alimentaire et à la gouvernance connexe, puisqu'il s'agit d'un vaste sujet complexe.

## 2.3. Résultats

La complexité est un facteur clé de la chaîne d'approvisionnement alimentaire. Celle-ci est constituée d'un vaste éventail d'acteurs, y compris les producteurs, les transformateurs, les distributeurs et les détaillants, ainsi que les restaurateurs et les consommateurs. Considérant le rôle réglementaire en vigueur, on peut aussi inclure le gouvernement dans cette liste. Ces acteurs diffèrent en fonction de plusieurs critères. Au-delà des différences fonctionnelles, leur envergure et emplacement sont également différents. La chaîne d'approvisionnement alimentaire est exploitée à de nombreux niveaux, soit à l'échelle locale et mondiale. Citons, à titre d'exemple de transactions réalisées au sein de la chaîne d'approvisionnement alimentaire, les fruits cultivés dans la région du sud de l'Ontario et achetés par un citoyen local dans un marché des fermiers, ainsi que l'importation de fruits vietnamiens au Canada par une grande chaîne d'alimentation.

On peut catégoriser la chaîne d'approvisionnement en considérant ses chaînes de valeur distinctes comme denrées (bœuf, porc, céréales, etc.). Le terme connexe « chaîne de valeur » reflète bien ce concept. Ce terme reconnaît que les denrées ont tendance à suivre des processus distincts, à partir de la participation des producteurs jusqu'au marché au détail qui, en fin de compte, offre le produit au consommateur.

Une tendance largement déclarée vise la stabilisation continue de la chaîne d'approvisionnement alimentaire (Sparling et coll., 2005). La force motrice de celle-ci est en partie due aux entreprises alimentaires multinationales dont l'envergure leur a permis d'influencer le comportement de leurs fournisseurs. Par conséquent, quoique la chaîne conserve globalement des gammes de denrées distinctes, elle est davantage centralisée et rationalisée. À l'heure actuelle, la chaîne représente un système étroitement interconnecté ayant pour résultat de produire souvent des répercussions considérables à la suite de tout changement ayant lieu dans un secteur ou un lieu particulier.

Au Canada, l'autorité réglementaire alimentaire est partagée entre les gouvernements fédéral et provinciaux. Le régime réglementaire est donc caractérisé par des champs de compétence parfois complexes. Outre cette complexité, on ajoute la prévalence croissante des normes internationales promulguées par l'intermédiaire des accords de libre-échange bilatéraux ainsi que le régime commercial multilatéral élargi, notamment l'Organisation mondiale du commerce (OMC) et ses organismes connexes. Les normes privées exercent également une certaine influence et l'adhésion à ces dernières comporte de plus en plus une condition minimale de facto à la participation au marché.

À un niveau supérieur au Canada, la chaîne d'approvisionnement alimentaire est donc assujettie à un dense maillage de réglementation publique et privée. En outre, les sources nationales et internationales exercent une pression dans le but de normaliser tous ces procédés. Dans une certaine mesure, la motivation est engendrée par le désir de maintenir l'accès aux marchés des États-Unis et de l'Union européenne, qui profitent de régimes dont la portée est considérable. Malgré cette pression, il ne faudrait pas définir le régime réglementaire canadien comme un système cohérent unique. Au contraire, il est plus précis de le considérer comme un amalgame de mécanismes distincts qui présentent des structures d'alignement variables.

Nos résultats sont organisés selon le cadre de référence établi par Hood et coll. Ce modèle considère le contenu et le contexte à l'intérieur d'un régime de réglementation des risques. Le premier concept, soit le contenu, est fondé sur la théorie cybernétique d'autorité qui se penche sur la gestion d'un secteur particulier de la politique. On constate que les trois facettes de cette autorité, soit la collecte de données, l'élaboration de normes et la modification du comportement, doivent être présentes afin de maîtriser l'intégralité du système. Le dernier concept, à savoir le contexte, se rapporte aux trois facteurs qui influencent généralement le contexte du régime, notamment, la nature technique du risque (hypothèse de la défaillance du marché), les opinions publiques et médiatiques sur le risque (hypothèse de l'opinion-réceptivité) et la façon dont le pouvoir et l'influence sont concentrés (hypothèse des groupes d'intérêt).

### 2.3.1. Teneur du régime

#### *Collecte de données*

La collecte de données représente la composante la plus exhaustive et audacieuse du régime réglementaire canadien. Celle-ci comprend un grand nombre de mécanismes horizontaux et verticaux diversifiés, allant de forums de partage de l'information jusqu'aux inspections officielles. Le partage de l'information à l'échelle horizontale, par l'intermédiaire des forums multi organisationnels, tels qu'ils sont présentés par la Fédération canadienne de l'Agriculture, est généralement perçu favorablement par les intervenants au sein de l'industrie. Ils les considèrent comme des occasions d'établir un niveau de confiance amélioré entre l'industrie et les fonctionnaires en vue de faciliter le partage de renseignements exacts de façon régulière entre l'industrie et les gestionnaires chargés des situations d'urgence. Également visés sont les petits organismes, tels que les

associations d'industries provinciales, en vue de mettre à profit les capacités de collecte de données au sein des plus importantes associations comme les associations nationales. Dans le cas du partage de l'information à l'échelle verticale, par l'intermédiaire de la Table ronde sur la chaîne de valeur (TRCV) et autres mécanismes, la transparence semble être entravée par la nature hautement concurrentielle de l'industrie alimentaire. La traçabilité, soit la collecte de données sur un produit alors qu'il se déplace sur la chaîne d'approvisionnement, est devenue un objectif principal au sein de l'industrie. Les meilleurs systèmes technologiques de traçabilité ne cessent de s'améliorer et rehaussent la qualité des données disponibles auprès de l'industrie et des organismes réglementaires. Par contre, les exigences en matière de traçabilité varient d'une province à l'autre, et souvent, à l'heure actuelle, l'adhérence à un système de traçabilité s'effectue sur une base volontaire, en raison, dans certains cas, de la résistance aux programmes obligatoires établis par l'industrie. Les agences réglementaires provinciales et fédérales font également la collecte de données au moyen d'inspections effectuées selon une évaluation fondée sur les risques. On a mis l'accent sur la mise en application de la collecte de données de façon solide et du partage des mécanismes à la suite de plusieurs incidents de haute visibilité ayant mis en question la sécurité alimentaire, y compris l'encéphalopathie spongiforme bovine (ESB), les cas de grippe aviaire et les rappels d'aliments des entreprises Maple Leaf et XL (Ward, 2014). Le rapport Weatherill de 2008 sur l'éclosion de la listériose, par exemple, a signalé une problématique importante au chapitre du partage et de la coordination interministérielle de l'information. Entre temps, le partage des données est minimal quant aux dangers non liés à la sécurité alimentaire, comme la sécurité publique et la gestion des mesures d'urgence.

### *Élaboration de normes*

Les normes relatives à la chaîne d'approvisionnement alimentaire sont exhaustives, audacieuses et axées sur des règles adoptées en vertu des lois publiques et des codes de la pratique privée. Tel qu'il a été mentionné ci-dessus, la responsabilité du gouvernement quant à la chaîne d'approvisionnement alimentaire est partagée entre Ottawa et les provinces; cependant, Santé Canada dirige l'élaboration des normes au niveau fédéral. Généralement, il semble y avoir consensus sur la rigueur de ces normes dans les secteurs de la mise au rebut, de la distribution, de l'importation et de la transformation des aliments. La démarcation entre les règlements publics et privés est de plus en plus floue, et même quelques programmes ont été intégrés aux normes gouvernementales. Dans d'autres cas, le gouvernement se fie sur les programmes privés pour atteindre ses objectifs en matière de sécurité alimentaire, comme dans le cas des programmes On-Farm Food Safety (OFFS) élaborés en Alberta. Les facteurs internationaux, tels que la libéralisation commerciale en vertu de l'OMC et la consolidation des détaillants, influencent énormément les normes. Les détaillants importants en particulier détiennent un pouvoir d'achat considérable et peuvent imposer aux fournisseurs leurs normes préférées. En ce qui concerne le partage de données, la majorité des normes visent la sécurité alimentaire, par rapport à la sécurité publique, la continuité commerciale et la gestion des mesures d'urgence. La sécurité, par exemple, relève principalement du domaine des entreprises particulières. De même, les données recueillies dans le cadre nos entrevues et de l'étude de la documentation, démontrent une sensibilisation limitée par rapport aux

interdépendances au sein des secteurs d'infrastructures critiques. Les normes sont axées sur le maintien de la qualité et de l'intégrité des aliments, et moins sur la protection de l'accès au transport, à l'énergie et aux autres services essentiels en cas d'urgence.

### *Modification du comportement*

La modification du comportement passe par divers mécanismes publics et privés. L'ACIA dispose d'une plage d'outils de mise en application, y compris le pouvoir de délivrer des mises en garde, de suspendre ou d'annuler les permis, et de refuser l'entrée au Canada des cargaisons d'aliments. Le rapport Weatherill souligne plusieurs déficiences liées aux pratiques de mise en application de l'ACIA surtout en raison de la mise en œuvre de son Système de vérification de la conformité (SVC). La *Loi sur la salubrité des aliments au Canada*, dont l'entrée en vigueur est prévue en 2015, vise un grand nombre de ces enjeux (reste à savoir si ces mesures seront efficaces). La mise en application des normes privées est assurée par les organismes de certification tiers qui effectuent des inspections et des vérifications de conformité. L'intégration des normes privées dans les lois publiques signifie que les inspections gouvernementales font souvent office de mécanismes de conformité pour ces deux types de normes. Lorsqu'on détermine qu'il y a un risque alimentaire qui puisse nuire à la santé humaine, un rappel peut être initié. Depuis 2006, environ 200 à 300 rappels d'aliments ont été effectués annuellement au Canada (vérificateur général du Canada, 2013). Un récent rapport du vérificateur général conclut que les premières étapes du processus de rappel sont adéquates, mais qu'on ne connaît pas suffisamment les procédures de prise de décision donc les activités de suivi doivent être améliorées. En plus de l'application des normes, le gouvernement doit déployer des efforts assidus en matière de modification du comportement au sein de la chaîne d'approvisionnement alimentaire afin d'influencer le comportement du consommateur, par exemple, en ce qui a trait à la cuisson adéquate de la viande. Les connaissances et les comportements du consommateur semblent varier quant à la gamme des denrées. Les personnes qui manquent de compétences en matière de préparation d'aliments ont tendance à être touchées de façon disproportionnée quand l'approvisionnement alimentaire est perturbé.

### 2.3.2. Régime contextuel

#### *Marchés*

La chaîne d'approvisionnement alimentaire, comprenant un vaste éventail d'activités économiques diverses, souffre des coûts élevés liés aux données ainsi que des niveaux faibles et élevés des coûts d'exclusion. Les coûts des données sont élevés puisque le consommateur peut difficilement obtenir des données précises sur les sources d'aliments provenant de régions éloignées et les données fiables sur certains risques à faible éventualité sont absentes. De même, ces risques comportent des coûts d'exclusion élevés puisqu'ils peuvent potentiellement perturber énormément la distribution des aliments. Autrement, le consommateur détient un pouvoir considérable par l'intermédiaire des marchés, sur les marques et les denrées particulières. En d'autres termes, les coûts d'exclusion sont faibles en raison de la substituabilité de la majorité des produits

alimentaires. À la lumière de ces dynamiques, l'hypothèse de la défaillance du marché (HDM) semble offrir un compte rendu solide des efforts déployés par le gouvernement pour mettre en application des systèmes de collecte de données et des processus de dissémination, y compris de robustes mécanismes de traçabilité. L'efficacité des marchés actuels et des procédures de droit civil qui traitent certains coûts d'exclusion explique en partie la prévalence des normes privées plutôt que gouvernementales en matière de sécurité alimentaire. La concurrence au sein du marché pourrait limiter le potentiel de collaboration de la part du secteur privé en cas d'urgence étant donné qu'en raison de la substituabilité des produits alimentaires, lorsqu'une marque ou un produit est en difficulté, les autres en profitent. L'HDM est moins convaincante lorsqu'il s'agit de prendre en compte l'absence relative de l'attention réglementaire portée aux risques à faibles probabilités par rapport aux risques à conséquences élevées, pour lesquels il existe, sur le marché ou en vertu des lois, moins d'options de réduction des coûts d'exclusion.

### *Médias et opinion publique*

L'hypothèse de l'opinion-réceptivité (HOR) met l'emphase sur la manière dont sont formées les attitudes du public en matière de sécurité et de sûreté de la chaîne d'approvisionnement alimentaire en fonction des évaluations psychologiques des risques liés aux aliments. La documentation universitaire laisse entendre que souvent le consommateur s'offre à une perspective irrationnelle envers ces risques et se concentre de façon disproportionnée sur les dangers liés à la contamination et à l'application de la technologie en matière de production alimentaire. Quoiqu'elle soit potentiellement nuisible, la probabilité d'être touchée par ces types de dangers est relativement faible, surtout lorsqu'on la compare avec les risques liés à la consommation d'aliments malsains de façon habituelle. L'HOR est utile à cet égard puisqu'elle définit l'attention gouvernementale portée aux systèmes de traçabilité conçus pour traiter les enjeux de la sécurité alimentaire et de la contamination. L'HDM et l'HOR sont donc complémentaires puisque l'augmentation des préoccupations du public est directement manifestée dans le marché lorsque le consommateur choisit de ne pas acheter des denrées ou des marques qu'il juge non sécuritaires. L'HOR est encore plus complémentaire puisqu'elle offre un aperçu du manque d'attention réglementaire portée aux dangers liés à la sécurité alimentaire : l'absence au Canada d'attaques malveillantes contre l'approvisionnement alimentaire explique la faible attention donnée à l'élaboration de préparatifs visant à affronter ce risque. De plus, l'HOR souligne les raisons pour lesquelles certaines sociétés semblent profiter de tolérances élevées quant aux risques en ce qui concerne les produits alimentaires culturels (p. ex., fromage français fabriqué avec du lait non pasteurisé). Quoiqu'au Canada, à l'heure actuelle, 200 à 300 rappels alimentaires aient lieu annuellement, la majorité de ceux-ci reçoit relativement peu d'attention médiatique. Par contre, ils génèrent parfois une couverture médiatique énorme, surtout lorsqu'on puise dans les craintes psychologiques et sociales se rapportant aux maladies, à l'application de la technologie en matière de production alimentaire ou aux effets hormonaux, aux pesticides, aux antibiotiques et à la modification génétique. Selon notre analyse des médias, il semble que les urgences en matière de sécurité alimentaire ont tendance à générer une couverture médiatique ambivalente envers le gouvernement ou critique par

rapport à celui-ci lorsqu'il y a une perception de conflits entre les domaines de compétences ou les ministères. La couverture médiatique est difficile à prévoir et, de plus, hautement perturbatrice. La couverture négative peut semer des doutes sur la qualité d'un produit ou d'une marque, ce qui peut engendrer des pertes financières considérables pour l'industrie et l'économie dans son ensemble, comme le Canada en a fait l'expérience pendant l'éclosion de l'ESB en 2003.

### *Intérêts*

L'hypothèse des groupes d'intérêt (HGI) attire notre attention sur la structure et la disposition des groupes d'intérêt canadiens et la manière dont ils ont été touchés par la mondialisation de la chaîne d'approvisionnement alimentaire, la libéralisation du commerce international et les établissements politiques et économiques du pays. La chaîne d'approvisionnement alimentaire est formée d'une large gamme diversifiée de groupes d'intérêt n'ayant aucune association industrielle globale capable de maintenir des relations corporatistes avec le gouvernement, du moins, non pas à l'échelle nationale. La chaîne d'approvisionnement alimentaire s'oriente également de plus en plus vers des acteurs et des conditions extérieurs. Quoiqu'ils se fient toujours sur les exportations, les producteurs agricoles canadiens sont intégrés à l'heure actuelle aux chaînes d'approvisionnement verticales mondiales, par un degré sans précédent. Les facteurs externes, y compris les entreprises multinationales et les accords de libre-échange, exercent donc une incidence considérable sur le régime réglementaire canadien. Leur prééminence explique l'adoption générale des normes privées, qui sont considérées comme exigences minimales commerciales au sein des marchés étrangers. En outre, l'importance accordée au maintien de l'accès à ces marchés explique pourquoi le régime réglementaire canadien est axé sur la sécurité plutôt que la sûreté. La première pourrait compromettre la viabilité des denrées ou des marques canadiennes à long terme, tandis que la dernière ne pourrait que causer une perturbation temporaire des exportations canadiennes. En effet, les données recueillies lors de nos entrevues et l'étude de la documentation ont souligné l'importance de maintenir l'accès au marché américain. La nature fragmentée des groupes d'intérêt à l'échelle nationale souligne également la concurrence dans le secteur alimentaire ainsi que les défis auxquels sont confrontés le gouvernement en vue de favoriser le consensus dans l'ensemble des secteurs, y compris, par exemple, dans le cadre de la politique commerciale canadienne. En même temps, la mondialisation de la chaîne d'approvisionnement alimentaire correspond au transfert de pouvoir à l'échelle mondiale, ce qui réduit sans doute la latitude des gouvernements canadiens pour influencer globalement le régime.

### 2.3.3. Résumé des thématiques principales

Les points saillants soulignés dans notre analyse se résument en trois thématiques. Particulièrement, deux thématiques principales sont constantes dans l'ensemble des données relatives aux entrevues et à l'étude de la documentation. La première thématique traite de l'importance croissante des marchés et de la concurrence à titre de principes organisateurs du régime. La deuxième souligne les interdépendances entre la chaîne d'approvisionnement alimentaire et les autres secteurs d'infrastructures critiques.

En ce qui a trait à la première thématique, en tenant compte de la section précédente, il est évident que le régime de sécurité et de sûreté de la chaîne d'approvisionnement alimentaire canadienne progresse vers une dynamique fondée davantage sur les marchés. Plus encore qu'auparavant, il est possible que les décisions réglementaires soient prises en fonction de l'augmentation de la concurrence et de l'amélioration de l'efficacité de l'industrie canadienne et de la promotion du commerce international. Les participants aux entrevues, par exemple, affirmaient catégoriquement que l'importance primordiale vise à favoriser l'accès continu au marché américain des exportations canadiennes. L'intégration des produits agricoles canadiens aux chaînes d'approvisionnement mondiales élargies exige que les entreprises adoptent les normes préférées des acheteurs ou, à défaut de quoi, elles pourraient se voir refuser l'accès aux détaillants importants. De plus, l'expansion du régime commercial mondial fondé sur les règles offre des avantages aux exportateurs et aux consommateurs canadiens en ce qui concerne la réduction des prix et une variété accrue de produits, quoique la latitude réglementaire du gouvernement canadien soit restreinte.

La structure inhérente de la chaîne d'approvisionnement favorise la dynamique concurrentielle. La substituabilité des produits alimentaires est un aspect plutôt redondant qui améliore le caractère résilient de l'ensemble de la chaîne. Pourtant, cela signifie également que lorsqu'on pense qu'une denrée ou une marque n'est pas sécuritaire, d'autres denrées ou marques en profitent. De plus, la nature de l'opinion publique dans le contexte de l'alimentation démontre que les entreprises se fient sur la confiance du public quant à l'intégrité de leurs produits et à la qualité perçue de leurs marques.

La deuxième thématique souligne la mesure dans laquelle la chaîne d'approvisionnement alimentaire touche un réseau élargi de secteurs d'infrastructures critiques. Ceux-ci comprennent les services de transport et de l'énergie, les finances, l'eau potable et les services gouvernementaux, entre autres, lesquels sont tous indispensables au bon fonctionnement de la chaîne d'approvisionnement alimentaire. Ces interdépendances s'élargissent aussi pour inclure les infrastructures non critiques, comme l'industrie touristique, qui souffrent souvent des répercussions reliées à la sécurité alimentaire. Toutefois, nos données démontrent que ce fait est sous apprécié par le secteur alimentaire. Plutôt, la chaîne d'approvisionnement alimentaire semble se concentrer principalement sur le secteur alimentaire de façon isolée. Les forums de partage de l'information incluent rarement les acteurs qui ne sont pas directement touchés par la production, la distribution, la vente ou la réglementation des produits alimentaires. Les sociétés de transport participent parfois à ces forums, mais les organisations provenant d'autres secteurs d'infrastructures critiques y participent rarement, comme les secteurs de l'énergie ou des finances. Cette thématique vise également les enjeux liés à la centralisation accrue de la chaîne d'approvisionnement alimentaire et à la prolifération concomitante de seuls points d'échec, ainsi qu'à l'urbanisation croissante de la population canadienne. De nouveaux défis sont donc lancés en raison des capacités problématiques visant l'entreposage des aliments et le manque de compétences quant à la préparation de ces aliments.

#### 2.3.4. Retombées de la gestion des urgences

L'histoire canadienne récente compte très peu de cas de perturbation majeure en ce qui a trait à l'approvisionnement alimentaire. Donc les exemples sont rares quant à la manière dont le régime réglementaire relatif à l'approvisionnement alimentaire se comporte pendant les situations de faible probabilité/haute conséquence. Cela peut aider à expliquer pourquoi le régime met l'accent sur les échecs dans le cadre de la sécurité alimentaire (qui ont tendance à toucher des denrées particulières, mais non l'ensemble de la chaîne) plutôt que les risques comme les désastres naturels. D'après la documentation psychologique, cette notion est connue sous le nom de disponibilité heuristique, la notion qui propose que l'évaluation des risques soit influencée par la facilité avec laquelle on peut se rappeler les instants pertinents du risque. En d'autres termes, puisqu'il n'y a eu que très peu de cas dans l'histoire récente d'interruption soudaine de grande envergure relativement à l'accessibilité aux aliments, ni le gouvernement, ni l'industrie, ni le public sont motivés à consacrer des ressources pour se préparer à faire face à une telle situation susceptible de se produire à l'avenir.

#### *Dynamiques du marché*

Toujours à la lumière des thématiques mentionnées ci-dessus, il est possible de tirer des conclusions sur la vulnérabilité de l'approvisionnement alimentaire par rapport aux circonstances de faible conséquence/probabilité élevée. Nous pouvons aussi extrapoler la résilience potentielle du régime face à ces circonstances. Une manière de procéder consisterait à se pencher sur les types de comportements incités par la dynamique du régime.

Le changement vers une orientation du marché incite manifestement les acteurs au sein de la chaîne d'approvisionnement alimentaire, y compris les organismes de réglementation, à établir des objectifs financiers prioritaires. En effet, l'industrie alimentaire a toujours été motivée par le profit. Par contre, un changement s'est produit en ce qui a trait à l'ampleur du réalignement du régime réglementaire élargi en vue de faciliter la concurrence. Une orientation fondée sur le marché décourage les entreprises à révéler les données relatives à leurs vulnérabilités potentielles. Il s'agit d'une mesure incitative visant la non-divulgaration de renseignements au gouvernement en raison des préoccupations voulant que cette information soit partagée avec la concurrence, ou qu'elle engendre une baisse de la valeur de ses actions ou de ses profits en cas de diffusion aux marchés. Lorsqu'on découvre des problématiques liées à la sécurité alimentaire, les entreprises parfois suppriment tous les détails connexes et, plutôt que d'en aviser le gouvernement, elles adoptent l'attitude préconisée par Ralph Klein, ancien premier ministre de l'Alberta, à savoir, « tuer, enterrer et se taire » (Rossiter, 2011, 114).

De la perspective de la gestion des urgences, cette situation est problématique puisque les vulnérabilités d'une entreprise se manifestent parfois ailleurs. En dissimulant leurs vulnérabilités, les entreprises évitent leur détermination potentielle dans l'ensemble du secteur, ce qui contribue à augmenter la problématique au-delà de ce que pourrait l'imaginer une seule entreprise. Parallèlement, une orientation du marché sous-estime la

volonté des concurrents à collaborer, étant donné les gains financiers susmentionnés dont profitent les denrées et les marques lorsque leurs substituts sont touchés par des cas d'urgence relatifs à la sécurité ou à la sûreté. De même, malgré une opinion quelquefois retenue voulant que les détaillants donnent leurs produits gratuitement en temps de crise, aucune mesure ne les contraint à le faire. En dernier lieu, l'étendue restreinte de la souplesse réglementaire créée par les nombreuses obligations internationales en vigueur au Canada ainsi que le régime national étendu en matière de sécurité alimentaire, pourrait limiter la capacité du gouvernement ou d'autres acteurs à l'accès ou à la distribution des aliments en cas d'urgence. En Australie, par exemple, lors des inondations de Queensland en 2010-2011, les exigences réglementaires visant les permis de camionnage et les heures d'ouverture des détaillants ont ralenti les efforts déployés par les intervenants gouvernementaux. (Australie. Department of Agriculture, Fisheries and Forestry, 2012 : xii). [Ministère de l'Agriculture, des Pêches et de la Foresterie de l'Australie].

Généralement, les dynamiques du marché favorisent une démarche rationnelle vers la confiance, en vertu de laquelle le potentiel de renforcement de celle-ci existe lorsque les acteurs partagent les mêmes intérêts. Les marchés profitent donc de mécanismes organisationnels efficaces lorsque le gouvernement et l'industrie visent des objectifs similaires, soit convaincre le consommateur de la qualité et de la sécurité des produits agricoles canadiens. La confiance est cependant plus difficile à établir lorsque la concurrence est présente. De cette façon, le gouvernement crée une situation de vulnérabilité par la promotion de la concurrence au sein de la chaîne d'approvisionnement alimentaire. Il lance également un défi par rapport à l'objectif de la Stratégie nationale sur les infrastructures essentielles en vue de créer des partenariats entre le gouvernement, les propriétaires et les exploitants d'infrastructures critiques. En favorisant un environnement plus concurrentiel, la méthode réglementaire actuelle visant à traiter la sécurité et la sûreté des aliments contraint potentiellement la confiance et la collaboration préconisées en vertu de la stratégie nationale.

### *Interdépendances*

L'interdépendance au sein de la chaîne d'approvisionnement alimentaire, ainsi que le manque relatif d'attention accordée à ce sujet à l'intérieur de la chaîne, crée une seconde gamme de vulnérabilités. Tel qu'il est mentionné ci-dessus, de nombreuses vulnérabilités découlent des longues chaînes d'approvisionnement qui caractérisent de plus en plus le système alimentaire mondial. Ces chaînes exigent la participation des services de transport, d'énergie, de technologies d'information et de communication (TI ou cyber), de sources d'eau potable, de finances et d'autres secteurs. Ceux-ci se fient sur la main-d'œuvre et le pétrole, donc elles sont vulnérables en cas de pénurie. Une perturbation ayant lieu dans un secteur particulier engendre facilement des répercussions dans le secteur alimentaire. Une attaque terroriste contre une infrastructure de transport peut potentiellement perturber l'accès aux aliments au même degré qu'une contamination alimentaire intentionnelle.

En outre, un seul désastre peut produire des effets de cascade et provoquer des défaillances dans d'autres secteurs. Par exemple, en plus des retombées sur

l'approvisionnement alimentaire, un désastre naturel pourrait produire des pénuries en matière de main-d'œuvre et de pétrole, ce qui aurait pour résultat d'aggraver les pénuries d'aliments. Ainsi, la défaillance initiale est aggravée par les déficiences connexes subséquentes.

Étant donné l'importance de l'opinion publique, une préoccupation connexe vise l'amplification des effets produits par les médias sociaux. Ceux-ci rendent la tâche du gouvernement et de l'industrie plus difficile lorsqu'il s'agit de mettre les freins sur une histoire qui a déjà débuté. En conséquence, quoiqu'il soit peu probable qu'un risque de sécurité alimentaire ait un impact dévastateur rationnel sur l'approvisionnement alimentaire, son potentiel à changer le comportement du consommateur pourrait en fait engendrer des pertes majeures pour les entreprises canadiennes.

Il existe également des vulnérabilités associées au caractère urbain croissant de la population canadienne, tout particulièrement en considérant les répercussions sur l'entreposage des aliments et les compétences en matière de préparation de ceux-ci. L'accessibilité globale aux aliments nutritifs ne dépend pas seulement sur l'intégrité physique de la chaîne d'approvisionnement alimentaire, mais aussi sur la capacité des particuliers à conserver les aliments frais et à les apprêter de façon sécuritaire. De plus, la perception de la qualité des aliments canadiens crée des retombées dans d'autres secteurs de l'économie. L'Angleterre a connu les effets néfastes de cette interdépendance en 2001 lorsque son industrie touristique rurale, étroitement reliée à l'agriculture, a subi des pertes estimées à 100 M£ par semaine à la suite de l'écllosion de la fièvre aphteuse (Mosely, 2001).<sup>3</sup>

Selon Renn (2008), les circonstances de faible probabilité/conséquence élevée comportent des risques incertains. Il existe insuffisamment de données pour effectuer une estimation qui ne soit que floue en ce qui concerne les probabilités qu'un risque se produise. Pour certains risques, il est possible de déterminer les agents causaux, mais leur manifestation est rare et imprévisible. L'absorption de ces risques exige l'amélioration de la capacité de résilience du système, et, en conséquence, la réduction du potentiel de catastrophe, même en l'absence de menaces concrètes, contribuant ainsi à la souplesse et au renforcement des procédures de gestion des situations d'urgence (Renn, 2008, 46). De plus, les évaluations des risques doivent comprendre la rétroaction d'un vaste éventail d'experts et d'intervenants qui formulent des décisions à la suite de discussions ouvertes et réflexives sur le niveau acceptable des risques. Dans la mesure du possible, les participants doivent arriver à un consensus. Renn constate que cette démarche peut prendre diverses formes, à savoir « les tables rondes, les forums ouverts et les exercices portant sur la prise de décision par la négociation, la médiation ou les comités consultatifs mixtes sur lesquels siègent les scientifiques et les intervenants » (2008, 52). Quoique ces types de forums présentent couramment les enjeux liés à la sécurité alimentaire, ils

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<sup>3</sup> De plus, il est probablement plus difficile pour les gouvernements d'indemniser l'industrie touristique que l'industrie agricole vu la difficulté à déterminer le nombre de visiteurs étrangers qui ont choisi de ne pas se rendre au pays par rapport à la transaction relativement simple qui consiste à payer les producteurs agricoles pour abattre les animaux infectés.

semblent traiter moins souvent du sujet des risques à faible probabilité/conséquence élevée.

## 2.4. Recommandations

### *Dynamiques du marché*

- Inciter la collaboration entre les entreprises ainsi que le secteur privé et le gouvernement. Étant donné la nature de l'industrie orientée sur les exportations, on pourrait envisager de mettre l'accent sur l'importance de maintenir la qualité des produits canadiens, telle qu'elle est perçue. Souligner les risques au sein de chaque secteur canadien étant perçus par les marchés étrangers comme sources d'aliments non sécuritaires.
- Reconnaître que la confiance dans un contexte hautement concurrentiel fondé sur les marchés est très contraignante et que ces contraintes sont susceptibles d'augmenter au fil du temps à mesure que les forces mondiales encouragent la concurrence au sein des marchés. La confiance interpersonnelle n'est qu'un aspect de la confiance; il importe de renforcer la confiance envers les normes, les processus de sécurité et de sûreté et l'efficacité et l'équité des mécanismes de mise en application. Favoriser la crédibilité en soulignant les capacités du régime à veiller sur la sécurité et la sûreté de l'approvisionnement alimentaire et imposer des pénalités lorsque les normes ne sont pas respectées. Le renforcement de la confiance envers les normes plutôt que les particuliers et les organismes peut aussi comporter des avantages pour l'industrie, par exemple, l'amélioration de la perception de la qualité des produits canadiens dans les marchés étrangers.
- Réfléchir au contexte dans le cadre de l'évaluation des forums de partage de l'information. Dans un environnement concurrentiel, il est peu probable que les entreprises divulguent volontairement des renseignements sur leurs vulnérabilités au sein d'un forum auquel participent les concurrents. Pour adresser ces mesures incitatives, considérer les ententes de non-divulgaration en supprimant les données signalétiques avant de partager l'information avec d'autres entreprises et présenter des pratiques exemplaires et des leçons génériques déterminées plutôt que des études de cas précis. De plus, continuer à recueillir des données par l'intermédiaire de moyens alternatifs, tels que les inspections et les vérifications, et en apprendre des autres pays et secteurs lorsque des situations à faible probabilité se produisent (p. ex., inondations en Australie en 2010-2011).
- Éclaircir les attentes dans le cadre du rôle joué par les épicerie, les banques alimentaires et autres détaillants en matière de fourniture des denrées et d'indemnisation en cas d'urgence. Malgré la présomption que les épicerie distribueraient des aliments gratuitement, et considérant les impératives du marché, la logistique reliée à la chaîne d'approvisionnement et les enjeux juridiques éventuels, il est possible que certaines entreprises, surtout les détaillants importants, cessent d'exploiter en temps de crise.

## *Interdépendances*

- Améliorer la sensibilisation envers les interdépendances d'infrastructures critiques entre la chaîne d'approvisionnement alimentaire et les autres secteurs, tels que les services de transport, d'eau potable et d'énergie ainsi que les secteurs des finances et de la TI. Encourager la planification de scénarios multisectoriels pour renforcer les capacités de collaboration en cas de perturbation majeure au sein de la chaîne d'approvisionnement alimentaire. Faciliter la tenue de forums de partage de l'information auxquels participent les organismes provenant d'autres secteurs et encourager l'étude d'une vaste plage de points de vue.
- Mettre à profit les pratiques sécuritaires et les infrastructures reconnues pour encourager l'efficacité de celles-ci.
- Favoriser la planification de la continuité commerciale en vue de lutter contre les effets des désastres naturels et autres dangers qui puissent produire des répercussions considérables sur la chaîne d'approvisionnement et la disponibilité des aliments. Déterminer les points de défaillances éventuelles uniques et analyser la façon dont une seule situation pourrait produire des déficiences dans de multiples secteurs interdépendants.
- Demander la participation de la GRC, de la Sécurité publique Canada et des agences provinciales de mise en application de la loi et de sécurité publique, par l'intermédiaire de forums sur l'approvisionnement alimentaire, pour faciliter une culture de sécurité au sein de l'industrie.
- Continuer à déployer des efforts auprès des provinces pour établir un cadre de référence en matière de gestion des urgences. Les projets ne sont pas toujours approuvés avant que le système ne soit atteint; par exemple, la Stratégie nationale sur les infrastructures essentielles n'avait pas reçu l'approbation du Cabinet avant que ne soit effectuée une vérification au sein du ministère. Un certain risque est associé à l'attente d'atteintes externes pour faire avancer les politiques réglementaires. Il pourrait s'agir d'un véritable cas d'atteinte, plutôt qu'une vérification, et dans un tel cas, le gouvernement n'aurait aucun processus en vigueur pour l'affronter. La coordination à paliers multiples non planifiée est susceptible d'engendrer des coûts de coordination plus élevés et également créer des conflits entre les agences. Les médias amplifieraient donc la situation. Les tentatives voulant réunir de nombreux intervenants, y compris les divers ordres gouvernementaux, sont souvent freinées au niveau du partage de l'information. Les normes ne sont donc pas mises en application et le comportement demeure inchangé. Le système n'est maîtrisé que lorsque ces trois composantes sont exécutées.

### *Autres recommandations*

- Découvrir les options reliées à la suspension des exigences réglementaires pendant les situations d'urgence afin d'acquérir et de distribuer les aliments nécessaires. Déterminer les obstacles réglementaires à la coordination efficace pendant une situation d'urgence et déployer des efforts pour les réduire ou au moins les contourner pendant une situation désastreuse. Pour repérer des obstacles réglementaires éventuels, étudier d'autres domaines de la politique et de secteurs d'infrastructures critiques, tels que les services de transport et de l'énergie ainsi que les banques.
- Communiquer clairement au public en temps opportun les mesures envisagées pour répondre aux urgences en matière de sécurité alimentaire, vu la préoccupation de l'opinion publique qui revêt souvent un caractère émotif ou psychométrique plutôt que rationnel en ce qui concerne la sécurité alimentaire. Mettre l'accent sur l'endiguement, la maîtrise et les normes élevées. Envisager le potentiel de conflits entre les divers champs de compétence en déterminant les responsabilités aux niveaux fédéral et provinciaux. Élaborer des stratégies de communication pour lutter contre les effets amplificateurs des médias sociaux.
- Veiller à ce que les bureaux de gestion des urgences et les premiers répondants aident les personnes n'ayant aucune compétence en matière de préparation des aliments pour affronter les perturbations produites contre la chaîne d'approvisionnement alimentaire. Créer des partenariats avec les provinces pour sensibiliser la population sur les compétences fondamentales en matière de préparation des aliments et de pratiques d'entreposage dans les écoles.

### 3. Introduction

This paper describes the regulatory regime for controlling risks to the Canadian food supply chain. In doing so, the paper examines how supply chain participants and regulators characterize safety and security threats, and explores the contextual issues that influence the regime. The paper draws on an analysis of 13 interviews with critical infrastructure (CI) regulators, owners, operators and managers whose organizations are involved in the food supply chain. Overall, the paper aims to offer an enhanced qualitative understanding of sector-specific risks, as well as recommendations for addressing vulnerabilities.

Building on the definition provided by the Australian Government, we use the term “food supply chain” to mean “the physical and information systems and processes” employed to deliver food products or services “from one location or entity to another” (Australia. Department of Agriculture, Fisheries and Forestry, 2012: vi). It encompasses the whole range of organizations and individuals involved in the production, distribution and use of food, from primary producers to consumers (Standing Committee on Agriculture and Agri-Food, 2013). Other terms for this are “food system” (see National Center for Food Protection and Defense, 2005) and “food distribution chain” (see Agriculture and Agri-Food Canada, 2009). Risks to the supply chain threaten the quality and accessibility of food in Canada. The control mechanism in question includes the various public and private mechanisms designed to regulate these risks, and to ensure access to food in the event of a disaster.

Given this definition, we are interested in a wide variety of risks. We are not, however, concerned with health or environmental risks caused by long-term exposure to harmful substances through the food supply chain. Instead, this paper focuses on food supply emergencies, meaning acute crises that present immediate risks to Canadians. We see these types of emergencies falling into three groups. The first group includes industrial accidents and unintentional food safety emergencies, such as the 2008 listeriosis outbreak (see Agriculture and Agri-Food Canada, 2009). The second group includes security risks stemming from the intentional contamination of the supply chain by malicious actors, and the third group includes major disruptions to supply chain infrastructure due to natural disasters.

Although the fish and seafood sector represents a major component of the food supply chain, we do not address it directly in this paper. This is largely because we did not interview anyone with expertise in fish and seafood harvesting, processing or distribution. The close integration of these products into the broader food supply chain, however, means that many of our findings are nonetheless relevant to food safety and security risks in the context of fish and seafood.

Finally, note that the focus of this paper is the regulatory regime in place to prevent these and other types of risks. Hood *et al.* (2001: 9) define regime as “the complex of institutional geography, rules, practice and animating ideas that are associated with the regulation of a particular risk or hazard.” In general, we do not discuss specific plans or

processes for responding to food supply emergencies; the paper is not intended to provide detailed emergency management guidelines or comment on such guidelines. Rather, the paper should be read as an account of the regulatory regime for controlling risks to the food supply chain *before* they manifest as emergencies.

### **3.1. Definitions**

We refer frequently in this paper to the terms safety, security, critical infrastructure protection, risk and regulation and private standards. We define these terms as follows.

#### *Safety and Security*

These terms are often used interchangeably, and indeed at times our interview participants conflated the two subjects. Security risks involve human aggressors who are influenced by a variety of environmental and personal factors and may come from within or outside the target institution (Reniers and Pavlova, 2013: 8). While their outcomes may be similar, security and safety risks demand different approaches to risk management. “[P]rotecting installations against intentional attacks,” write Reniers and Pavlova, “is fundamentally different from protecting against random accidents or acts of nature” (2013: 3; see also Russell and Simpson, 2010). Human aggressors are adaptive agents; they will modify their behaviour in light of security practices organizations adopt. Generally, safety plans tend to be more transparent, are informed by more reliable data and are regulated more clearly. Safety plans are also more clearly entrenched in the organizational culture and legal tradition of many critical infrastructure sectors.

#### *Critical Infrastructure Protection*

Critical infrastructure protection (CIP) seeks to enhance the physical and cyber security of key public and private assets and mitigate the effects of natural disasters, industrial accidents and terrorist attacks. The Government of Canada has identified ten critical sectors (Public Safety Canada, 2014). Most Western governments have similar – though not identical – lists for their countries. The UK government has identified nine sectors (United Kingdom. Centre for the Protection of National Infrastructure, n.d.) and the U.S. government has identified 16 (United States Department of Homeland Security, 2014), for example.

#### *Risk and Regulation*

Risk is a probability, though not necessarily calculable in practice, of adverse consequences (Hood *et al.*, 2001). Regulation means an attempt to control or mitigate risk, mainly by setting and enforcing product or behavioural standards (Hood *et al.*, 2001). Risk regulation is governmental intervention in market or social processes to influence and control to varying degrees potential adverse social and economic consequences.

## *Private Standards*

Private standards are safety, security or quality requirements for one or more segments of the food supply chain developed by firms, industry associations or other private sector entities.<sup>4</sup> Private standards are becoming increasingly prevalent and often represent the minimum requirement for integration into major supply chains. The line between government regulations and private standards is becoming less distinct; some private standards are endorsed by government and others have informed the development of new government regulations.

### **3.2. Terrorism and the Food Supply Chain**

A prominent theme in our data is the rarity of planned or executed terrorist attacks against the Canadian food supply chain. Intentional contaminations have occurred in the past, but none appears to have been motivated by ideological or religious objectives.<sup>5</sup> This is similarly the case in the United States, which has experienced only one ideologically-motivated attack against its food supply chain: in 1984, members of a religious cult contaminated salad bars at several restaurants in The Dalles, Oregon, with salmonella, causing sickness in 751 people (45 of whom were hospitalized) but no deaths (Tolok *et al.*, 1997).<sup>6</sup>

The absence of terrorist attacks in both countries cannot be explained by existing security practices, which continue to leave the supply chain vulnerable to attack. This is not an indictment of either government or the private sector, but rather an acknowledgement of the chain's vast size and complexity and perhaps inherent resilience. The grain distribution system, for instance, provides numerous points where malicious actors could introduce contaminants. To underscore this point, Nganie, Wilson and Nolan point out that it would be tricky but not impossible to “spread anthrax spores on top of grain waiting in an elevator for shipment” (2004: 151). Similarly, Casagrande (2000) warns that some terror groups could develop the “ability to infect large swathes” of agriculture “with pathogens that can cause severe economic disruption” (92).

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<sup>4</sup> Henson and Reardon (2005) distinguish between private *standards*, which are specific criteria to which firms must adhere, and *quality metasystems*, which are broader codes of conduct intended to facilitate safety or quality objectives across multiple segments of the supply chain. In this paper we use the term private standards to refer to both concepts.

<sup>5</sup> In Canada, perhaps the most troubling example of the use of food as a delivery mechanism for harmful contaminants occurred in 1970, when “a postgraduate student in parasitology at an agricultural institute near Montreal” was accused of contaminating “food consumed by his roommates with the ova of *Ascaris suum*, a large worm of pigs” (Sobel, Khan and Swerdlow, 2002: 874). To reiterate, however, this incident was a deliberate attack against specific individuals – and in fact the perpetrator was later charged with (but ultimately acquitted of) attempted murder (Levinson, 1971) – rather than the sort of ideologically motivated action normally associated with terrorism.

<sup>6</sup> As in Canada, malicious contaminations do occur in the United States. A recent press release by the U.S. Food and Drug Administration (FDA), for example, highlights a 2009 case in which “more than 40 people in Kansas became ill after disgruntled restaurant employees intentionally contaminated salsa with a pesticide” (United States Food and Drug Administration, 2013).

Still, despite these vulnerabilities, the food supply is protected to some degree by the advanced technical knowledge required to execute a successful attack against it. Using the supply chain as a delivery mechanism is not a straightforward exercise. As Cameron and Pate emphasize, although “some agricultural agents might be relatively easily obtained and could be crudely delivered, a more sophisticated approach would be required to cause a catastrophic incident” (2001: 63). Similarly, to cause significant economic damage would require some familiarity with the broader food supply infrastructure, including for example the location of primary distribution centres, main transportation routes and so on. Moreover, as Elbers and Knutsson argue, of the “hundreds of animal pathogens and pests available to an agroterrorist, perhaps fewer than a couple dozen represent significant economic threats” (2013: S27). Based on past rates of agricultural terrorism alone, “the actual risks of an ... attack are quite minute” (Turvey *et al.*, 2007: 71).

Existing food safety mechanisms would likely help detect and address an intentional contamination event. As we outline below, government and industry have invested significant resources to develop information-gathering and surveillance mechanisms. Although not perfect – food-borne illnesses continue to affect large numbers of people regularly – these mechanisms would nonetheless assist authorities in limiting the potential damage of a so-called agroterrorist attack by identifying its source and nature. The extent to which a regulatory regime is characterized by “robust surveillance, speedy investigation of outbreaks, laboratory-diagnostic capacity and communication between” health care providers, public health agencies and the media will determine its ability to keep the consequences of an attack “to a minimum by rapid identification of contaminated food and removal of this food from circulation” (Sobel *et al.*, 2002: 874).

The vulnerability of the supply chain to malicious attack is therefore increased where there are gaps in the food safety regime, including toward the consumer end of the chain. Indeed, once a consumer purchases a food product, government’s regulatory role is greatly reduced, at least in terms of controlling the handling of that product. Yet even before the food is taken home, there is a risk of in-store tampering.

This is similarly the case for non-food products. In the 1982 Tylenol contamination case, for example, an individual purchased and later poisoned several bottles of Tylenol with potassium cyanide before returning the bottles to store shelves, causing the deaths of seven people who ingested the poisoned capsules (Wolnik *et al.*, 1984). These methods may appeal to terrorists or other malicious actors because they maximize the potential for inflicting severe harm. On the other hand, they reduce the potential scope of an attack to customers who shop at the targeted store. From a purely rational perspective, the probability of being affected by this type of attack is extremely low. Their primary effect therefore appears to be psychological, at least insofar as they alter consumer behaviour or cause panic.

Many of our interview participants did not discuss terrorism risks explicitly. For the reasons alluded to above, however, our discussion of the food safety regime is nevertheless useful for examining terrorism preparedness, because the same systems used

to detect accidental contaminations would be used to detect and respond to intentional ones. Conversely, vulnerabilities in the food safety regime represent vulnerabilities that could be exploited by malicious actors.

In considering the contextual influences on the Canadian regulatory regime – and particularly the effects of public opinion – it is important to keep in mind that the consequences of an intentional contamination for public confidence in a particular brand or commodity may be similar to that of an unintentional one. Turvey *et al.* make this point by using the consequences of the 2003 bovine spongiform encephalitis (BSE) scare as a model for the potential damage of an agroterrorist attack (2007: 71). As noted above, this is similarly the case with in-store tampering, such as the 1982 Tylenol poisonings. In short, although much of our discussion of risk regulation in the Canadian food supply chain does not deal with terrorism explicitly, it still holds value insofar as it examines and seeks to explain the system that would be the forefront of responding to any terrorist attack.

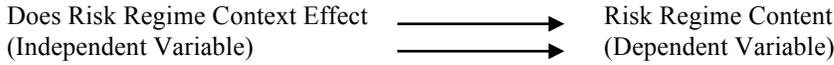
### **3.3. The Hood Framework**

Our research, including analysis of the interview transcripts, is structured according to Hood *et al.*'s (2001) meso-level risk regulation regime framework. In their study of risk regulation in the UK, Hood *et al.* define regimes as “the complex of institutional geography, rules, practice and animating ideas that are associated with the regulation of a particular risk or hazard” (Hood *et al.*, 2001: 9). Hood *et al.* hypothesize that within these regimes context shapes the manner in which risk is regulated. ‘Regime context’ refers to the backdrop of regulation. There are three elements that Hood *et al.* use to explore context: the technical nature of the risk; the public’s and media’s opinions about the risk; and the way power and influence are concentrated in organized groups in the regime.

Hood *et al.* (2001) employ the cybernetic theory of control to examine the management of the specific policy area; they refer to this as ‘regime content’. The theory asserts that if the three dimensions of control – information gathering, standard setting and behaviour modification – are under control, the system is effectively under control.

**Figure 1: Understanding risk regulation regimes**

Source: Hood *et al.* (2001)

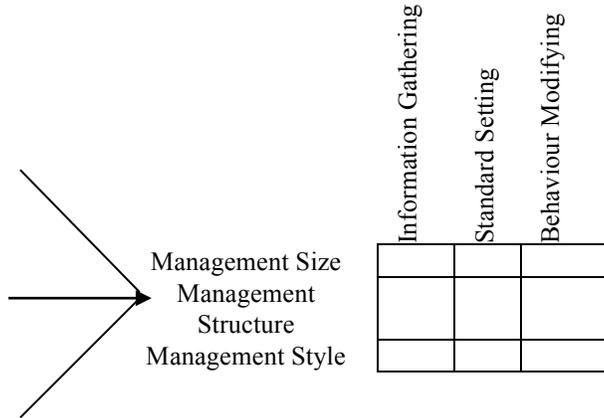


*Sub-Hypotheses*

*Market Failure Hypothesis*  
(Indicators: Technical nature of the risk, the law, insurance)

*Opinion Responsive Hypothesis*  
(Indicators: Public opinion and the media)

*Interest Group Hypothesis*  
(Indicator: Concentration of costs and benefits as a result of policy choices)



We will discuss each of the three control components in turn. Information gathering is the capacity to obtain data that can be used to shape regime content. Information may be gathered actively or passively, both beyond the system and within it (Hood *et al.*, 2001: 22). Standard setting involves establishing goals, or guidelines; in government, standards often take the form of policy. Finally, behaviour modification refers to the preferences, incentive structures, beliefs and attitudes that shape systems – the capacity to modify behaviour of participants is the capacity to change systems. The distinction between these dimensions is not always tidy; Hood *et al.* (2001: 21) note, for instance, that information gathering may influence behaviour if people know they are being watched.

Each dimension of control may be further considered according to: size – the amount and scope of regulation and the resources used to sustain it; structure – the institutional arrangements of regime content, such as public-private sector relationships; and, style – the formal and informal codes and conventions that help shape regime content (Hood *et al.*, 2001: 30-32).

## 4. Regime Content

A key feature of the Canadian food supply chain is its complexity. In addition to consumers, the chain comprises suppliers, producers, processors, manufacturers, restaurants and retailers of varying size and sophistication, from small family-owned farms to multinational companies. A widely reported trend is the continued consolidation and industrialization of the food supply chain (Sparling *et al.*, 2005). Today, the chain is a tightly coupled, interconnected system, with changes in one sector or location often producing extensive repercussions. At the same time, the overall food supply chain contains distinct commodity value chains (beef, pork, grains, etc.). These value chains may be further differentiated by product and location; a capital-intensive beef farm, for example, faces different pressures and risks than a fast-food hamburger restaurant (Canada. Parliament, 2013: 4).

All participants in the overall food supply chain are implicated to some degree in controlling food safety and security risks. With respect to food safety, the Canadian Food Inspection Agency is the lead agency at the federal level. Table 1, adapted from a CFIA report, illustrates the roles and responsibilities of the various actors in the supply chain in terms of addressing safety risks. Note that this table does not address security risks.

**Table 1: Safety responsibilities in the Canadian food supply chain**

*Source:* Canadian Food Inspection Agency (2013b: 7)

International	Provincial/ municipal agencies	CFIA	Other federal departments	Industry	Consumers
Global food supply	Enforce food safety laws within their jurisdiction	Delivers federal food inspection programs	Lead public health surveillance and outbreak investigations	Responsible for the production of safe food in compliance with government standards	Responsible for safe food handling and preparation
Market and trade	Inspection, public health and food safety surveillance	Investigates foods linked to illness outbreaks	Develop health policies and standards and conduct health risk assessments		
Comparability and acceptance of food systems		Initiates food recalls			
Meet import requirements, provide export requirements					

### 4.1. Information Gathering

Information gathering within the food supply chain occurs both horizontally (that is, across commodity value chains) and vertically (up and down the value chain of a single commodity). Horizontal information sharing occurs through multi-organizational forums. These forums include industry associations, such as the Canadian Federation of

Agriculture, the Canadian Supply Chain Food Safety Coalition and, formerly, the Canadian Council of Grocery Distributors (FI 1; FI 2; FI 3; FI 6; FI 10), and government-led committees, such as the Industry-Government Advisory Committee (IGAC) on traceability (FI 11). In some cases, these forums serve as the main conduit for high-level information sharing between industry and food safety regulators and emergency management agencies (FI 1; FI 3; FI 6). These forums may also have participation by private citizens, including animal rights and environmental activists (FI 6).

Interview respondents generally offered positive assessments of these forums (FI 2; FI 3; FI 6; FI 7; FI 9; FI 10; FI 11), describing them as opportunities to establish and enhance trust between industry and government officials (FI 10; FI 11); to facilitate regular and precise information sharing between industry and emergency managers (FI 6); and for small organizations, such as provincial industry associations, to leverage the information-gathering capacity of larger organizations, such as national associations (FI 2). The nature of the information shared at these forums varies; animal health (FI 6; FI 7), food safety (FI 7; FI 9; FI 10; FI 11), emergency management and business continuity (FI 1; FI 2), and business-related topics such as advertising and market research (FI 2; FI 7) are typical agenda items, depending on the forum. Security-related issues, however, such as biosecurity (intentional contamination), are rarely discussed (FI 6; FI 10).

Respondents provided several reasons for the efficacy of information-sharing forums. Producers suggested that the Canadian agriculture sector operates according to a culture of openness and transparency (FI 6; FI 10). Similarly, grocers and retailers argued that their sector does not compete on food safety, because food safety issues often affect brands that are sold at multiple stores (FI 1; FI 2; FI 3).<sup>7</sup> According to respondents, this enables extensive cooperation and information sharing with respect to risks. A non-competitive attitude toward food safety is also evident among food banks (FI 9), likely due to their non-profit status and to the humanitarian nature of their mission.

The confidence of private sector interview participants in the openness of information sharing is notable given the highly competitive nature of the food industry, which typically incentivizes a cautious attitude toward transparency. It may be that interview participants were speaking about information sharing in broad terms – the dissemination of generic best practices, for example – as opposed to providing sensitive data about specific vulnerabilities. Indeed, as noted below, there is a reluctance to share information in other forums, particularly those bringing together competitors. Beyond the competitive dynamics of the market, a related challenge to information sharing comes from government requirements with respect to privacy and informed consent (FI 13).

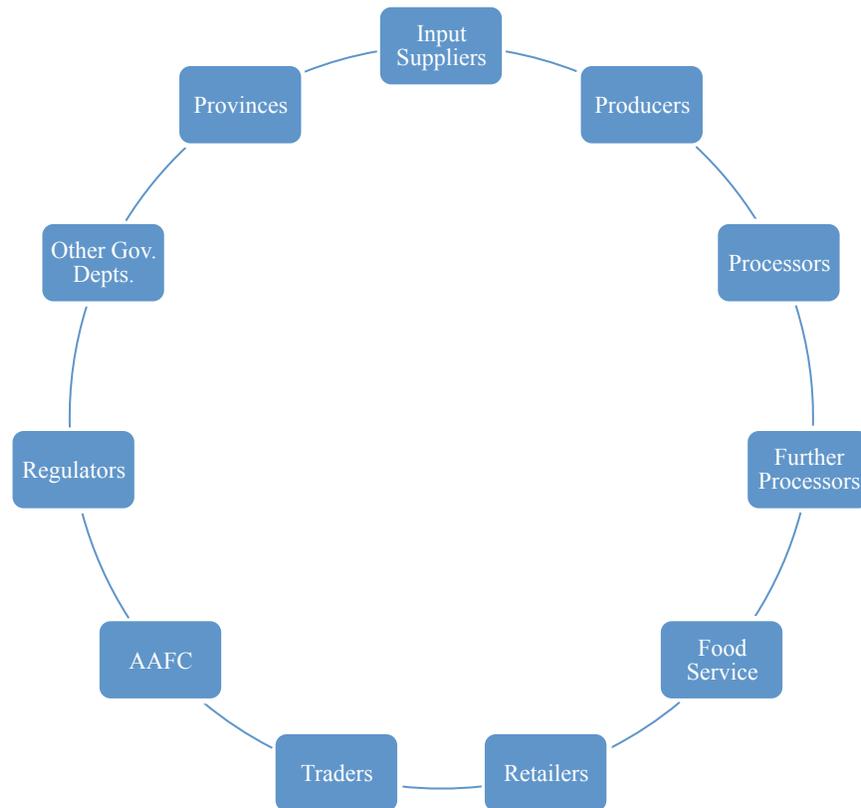
Vertical information gathering, or information gathering within a commodity value chain, is facilitated by the federal government through Value Chain Roundtables (VCRTs). These forums bring together “key industry leaders from across the value chain – input suppliers, producers, processors, food service industries, retailers, traders and

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<sup>7</sup> The growing popularity of retailer-owned private label goods, however, may be changing this dynamic (see Fagotto, 2014).

associations – with federal and provincial government policy makers” (Agriculture and Agri-Food Canada, 2014b). Figure 2 illustrates the typical membership of a VCRT.

**Figure 2: Value Chain Roundtable membership**  
*Source: Agriculture and Agri-Food Canada (2014b)*



Our interview data provide mixed evidence for the efficacy of VCRTs. A regulator we interviewed suggested that VCRTs are useful for sharing information between government agencies and for receiving input from industry on food safety issues (FI 13). One interview respondent (an academic), in contrast, argued that firms are often reluctant to participate because they view other companies in the chain as competitors or, at best, as business partners with whom they prefer to share only transactional information (FI 12).

Discussions at VCRT meetings tend to be highly sensitive and participation is controlled strictly (FI 13). Public minutes of VCRT meetings are available, but specific details are omitted about the information shared (FI 13). One of our interview participants explained that in Alberta some producers are wary of government programs such as these because they fear it will lead to increased government intervention in the market (FI 11). The openness to information sharing described above in the context of industry-led information-sharing mechanisms appears to be less evident in VCRTs and other government-organized forums. In particular, information sharing about specific business

practices and vulnerabilities is seen as more difficult to achieve than information sharing about generic food safety issues (FI 13).

Vertical information sharing also involves technically sophisticated evaluation and monitoring mechanisms. Traceability, which refers to the collection of data about a product as it moves through the supply chain, has evolved into a key objective for industry in the wake of high-profile incidents such as the BSE and avian flu incidents and the Maple Leaf and XL Foods recalls (Ward, 2014: para. 1). The quality of traceability systems, including the accuracy of data collected, varies across the agriculture sector (FI 7; FI 11; FI 12). Whereas some chains continue to rely on tattoos (FI 6), other producers use radio-frequency identification (RFID) tags and global positioning systems (GPS) to track animals (FI 7; Ward, 2014), which improves the quality and availability of information about an animal or a product.

Commodity value chains also vary with respect to the frequency and stringency of reporting requirements; the cattle industry, for example, reports less information to traceability databases than the swine and chicken industries (FI 11). Quebec's ATQ (Agri-Traçabilité Québec) system is widely seen as the most advanced, and aggressive, in Canada (FI 7; Murphy *et al.*, 2008; Ward, 2014).

Many of the country's leading traceability systems, including ATQ and its national equivalent, the Canadian Cattle Identification Agency (CCIA), as well as the Canadian Sheep Identification Program, are autonomous, not-for-profit organizations led by industry and funded in part by government (FI 11). At present, private sector, provincial and federal databases storing traceability data are not integrated, which can affect the timeliness of a disease response (FI 11). Reporting requirements are often not mandatory (FI 12). In the case of cattle, the availability of information about certain stages of a cow's life therefore depends on whether a farmer chose to record it (Hobbs, 2003a: 9; FI 12). The federal government has committed to developing an integrated, national traceability system (Agriculture and Agri-Food Canada, 2013), although it is unclear when the system will be introduced. In 2014, the federal government announced \$7.5 million in funding for the Canadian Agri-Traceability Services (CATS), a non-profit corporation whose board includes representatives from CCIA and ATQ, to "develop, implement and operate a national livestock traceability data service" (Agriculture and Agri-Food Canada, 2014a). Because traceability programs can be expensive to operate, a challenge for government in implementing more stringent traceability requirements is resistance from industry.

Traceability has recently become the subject of dispute between Canada and the United States. In 2009, the U.S. brought in new rules with respect to country-of-origin labelling (COOL). The ostensible purpose of these requirements is to allow consumers to identify the source of food products in retail stores (the requirements do not apply to restaurants or processed commodities) and thereby avoid food they deem to be unsafe. Canada and Mexico challenged these requirements at the WTO in 2009. They argued in part that the COOL standards are discriminatory because they are designed to appeal to nationalist sentiment rather than fulfil a legitimate food safety objective. According to this argument,

consumers are more likely to purchase food from domestic producers than foreign ones, all else being equal. As the WTO ruling notes, Canada's objective at the WTO was not to challenge "country of origin information on meat generally; rather, it [was] challenging the COOL measures because of its particular characteristics including its structure and objective, and the limited information it provides" (World Trade Organization, 2011: 149). A WTO dispute settlement panel agreed with this assessment and in November 2011 found the COOL requirements to be inconsistent with the United States' WTO obligations.

Since the ruling, U.S. efforts to bring its regime into conformity with the WTO have been challenged by Canada and Mexico for being insufficient. In October 2014, a WTO compliance panel reviewed the matter and determined that the "amended COOL measure *increases* the original COOL measure's detrimental impact" (World Trade Organization, 2014; emphasis added). This episode illustrates some of the broader contextual factors influencing the food safety regime, including the economic importance of maintaining access to markets such as the United States, the competitive nature of the sector and the types of activities national governments will undertake to support domestic industry.

Information regarding risks to the food supply is also gathered by federal and provincial agencies. At the federal level, the CFIA gathers information through inspections – for example, by testing animals at slaughterhouses to determine medication levels (FI 6). Provincial agencies inspect foods produced and sold within their borders (Health Canada and Canadian Food Inspection Agency, 2005: 2).

Inspections are conducted using risk-based assessments (Garcia Martinez *et al.*, 2007). Interview respondents had mixed attitudes regarding the extent and quality of information sharing between CFIA and industry. A commodity association representative said that CFIA divulges information only when it is formally requested or when an incident occurs (FI 7). Others, however, identified the CFIA as a primary source of risk-related information and analysis (FI 6; FI 9; FI 10).

## **4.2. Standard Setting**

With respect to standards, a major theme in both our interview data and the academic literature is the heavily regulated nature of the Canadian food supply chain. This is particularly the case in the area of food safety. Standards are the product of both federal and provincial legislation and industry self-regulation programs. Jurisdictional responsibility for the food supply is shared between the federal and provincial governments. At the federal level, the relevant legislation includes the *Food and Drugs Act*, the *Canada Agriculture Products Act*, the *Meat Inspection Act*, the *Fish Inspection Act*, the *Consumer Packaging and Labelling Act*, as well as various other statutes related to food production, distribution and processing (see Canadian Food Inspection Agency, 2014b). As noted above, complementary legislation exists at the provincial level (FI 11). Health Canada leads the development of standards at the federal level, and CFIA is responsible for their implementation. Notably, CFIA is "one of the few agencies in the world with responsibilities that cover the whole food continuum (both before and after

agricultural production)” (Canada. Parliament, 2012b: 2). Interview respondents highlighted the stringency of federal food safety standards in areas such as food disposal (FI 3), distribution (FI 3; FI 7; FI 9), importing (FI 2) and processing (FI 6). Traceability standards currently vary by province and value chain (FI 11).

An important institutional feature of the federal food safety system is the division of responsibilities between Agriculture and Agri-Food Canada (AAFC), Health Canada and CFIA. Following the 2008 listeriosis outbreak, responsibility for the food safety and inspection functions within CFIA were transferred from AAFC to Health Canada. AAFC, however, continues to oversee the CFIA’s work in areas unrelated to food safety, such as animal health, plant protection and trade (Health Canada, 2014). One of our interview participants was critical of this governance arrangement, arguing that it contributes to uncertainty and tension in terms of the focus of the agency, with the health portfolio generally overpowering agriculture (FI 12).

This is also evidence that it takes a high-consequence event – and indeed sometimes even a disaster – to bring about institutional change. A similar reorganization occurred in the UK after the BSE crisis in 1996. The Ministry of Agriculture, Fisheries and Food (MAFF) had previously been responsible for both food safety and market development and promotion of UK agricultural products. During the early days of the BSE crisis the latter objectives won out over the former: the Ministry’s “decisions were guided by attempts to protect the economic and financial interests of the farming community” rather than public safety (Beck, Asenova and Dickson, 2005: 403). As a result, in 2000, responsibility for food safety was removed from MAFF and placed under the purview of the newly-created Food Standards Agency (Millstone and van Zwanenberg, 2002). MAFF itself was later dissolved and replaced by the Department for Environment, Food and Rural Affairs.

The current federal regime will undergo major changes in 2015 when the *Safe Food for Canadians Act* enters into force. The Act was introduced in part in response to the recommendations of the Weatherill Report, which contains the findings of the inquiry into the 2008 listeriosis outbreak (Agriculture and Agri-Food Canada, 2009). According to federal government documentation, the Act will consolidate many of the food provisions administered by CFIA into a single statute, establish new authorities to develop regulations with respect to traceability and ensure consistency across inspection and enforcement (Canadian Food Inspection Agency, 2012).

In Canada, federal and provincial standards are often informed by industry-developed standards. Garcia Martinez *et al.* describe this approach to standard setting as a new “paradigm in stakeholder relationships characterized by complex interactions between public and private modes of regulation” (2007: 300). A prominent example of this approach is the Hazard Analysis and Critical Control Points (HACCP) method, which gained initial attention due to efforts by pork, chicken and egg commodity associations to develop voluntary safety codes. HACCP was later formally recognized and, in certain cases, made mandatory by the CFIA. This is often the case at the provincial level; Alberta, for example, currently endorses 15 On Farm Food Safety (OFFS) programs

delivered by provincial and national industry associations (Alberta. Agriculture and Rural Development, 2014).

Government standards are usually deemed the minimum threshold for participating in the market. That is, major commodity associations generally require members to implement standards that surpass government safety criteria. Among hog processors, for example, the CQA program, based on HACCP principles, is considered the industry standard, or requirement of sale, and many processors adhere to standards beyond the CQA (FI 6; FI 13). This is similarly the case among grocers (FI 3), beef producers (FI 7) and food banks (FI 9).

The globalization of food supply chains means standards in Canada are increasingly shaped by international trends. Under WTO agreements on the liberalization of trade in food commodities, Canada must adhere to international sanitary and phytosanitary standards (Henson, 2008: 68). Perhaps more influential, however, are private standards, whose rise has coincided with the global consolidation of supermarket chains. Wielding significant buying power, the so-called 'hypermarkets' are able to impose preferred standards on suppliers (Fagotto, 2014; Hayburn, 2014). In the Maritimes, supermarkets are not sufficiently concentrated to promulgate their own standards (FI 1); instead, many retailers subscribe to global systems, such as the Global Food Safety Initiative (GFSI). Table 2, adapted from a 2013 report by Grant and colleagues for the Conference Board of Canada, illustrates the prominence of private standards in Canada.

**Table 2: Summary of private standard systems in Canada***Source: Grant et al. (2013: 20)*

<b>Collective-National Systems</b>	<b>Sites Certified</b>
Canada Organic	3,914 farms 815 processors 380 handlers
CanadaGAP	916 (2,000 producer enrollees)
FeedAssure	170
<b>Collective-International Systems and GFSI</b>	<b>Sites Certified</b>
Safe Quality Food (SQF)	313
British Retail Council (BRC)	300
Food Safety System Certification (FSSC) 22000	56
International Featured Standard (IFS-Food)	10
Global Food Safety Initiative (GFSI)	Loblaw (all private-label suppliers) Sobeys (majority) Metro (40%)
GMP+ (feed)	105
Marine Stewardship Council	(6 fisheries in full assessment)
<b>Inter-Company Systems</b>	<b>Suppliers</b>
McDonald's Supplier Quality Management System (SQMS)	108
McCains food safety system	450
Loblaw private label suppliers (GFSI)	860
<b>Public Schemes</b>	<b>Sites Certified</b>
HACCP (federally registered)	1,482
Ontario Advantage HACCP/HACCP Plus	21

On issues of food safety, the Canadian food supply chain is thus subject to a complex and dense web of public and private standards. The blurring of the line between public and private regulatory systems is known in the literature as co-regulation (Garcia Martinez *et al.*, 2007; Henson, 2008). Overall, interview respondents described the existing standards in Canada as adequate. Although one respondent suggested that Canadian consumers face higher costs due to the expenses associated with meeting safety standards (FI 3) and another emphasized the need for increased stringency around traceability standards (FI

12), in general interview respondents expressed satisfaction with the existing safety regime (FI2; FI 3; FI 6; FI 7; FI 9; FI 12).

Other risk types, such as security risks and natural disasters, are less regulated than food safety (FI 10). Security remains largely the purview of individual firms (FI 2). Similarly, interview respondents reported few standards concerning emergency management planning for natural disasters (FI 7; FI 10). Food safety regulators at the provincial level often do not participate in terrorism preparations (FI 11). There has been some collaboration to date between the federal, provincial and territorial governments on developing a national disaster mitigation strategy (Canadian Intergovernmental Conference Secretariat, 2013) but this work has yet to produce a detailed framework for facilitating intergovernmental coordination. Business continuity planning generally occurs on a firm-by-firm basis (FI 10; FI 13), and few arrangements are in place to coordinate commodity value chains in the wake of a disaster (FI 7). There also appear to be few standards for addressing risks to food safety from poorly trained staff; high rates of labour turnover in the food processing industry, particularly in the case of seasonal commodities, pose challenges for firms in terms of ensuring adequate training (FI 13). Among retailers, during a natural disaster it is the responsibility of individual supermarkets to determine whether to donate food (FI 3). Given their limited storage and distribution capacity, food banks have little role to play in terms of mitigating food supply risks (FI 9).

Much of the challenge in addressing these hazards stems from the centralization of distribution networks and the ‘just-in-time’ imperative of the overall supply chain. Indeed, the sector’s thin margins incentivizes retailers to eliminate excess inventory, which means many regions in Canada would rapidly run out of food should a major distribution centre or transportation network be affected by a disaster (FI 3). Centralization and industrialization are also introducing new risks of their own, including for example hazards related to large farming operations where high concentrations of genetically identical animals facilitate the outbreak and rapid spread of dangerous viruses (see Fricker, 2014).

### **4.3. Behaviour Modification**

Behaviour modification, the third component of the Hood *et al.* framework, is conducted through a mix of public and private mechanisms. The CFIA possesses a variety of enforcement tools, including the authority to issue warnings, suspend or cancel licences and refuse entry into Canada of food shipments (Canadian Food Inspection Agency, 2013). None of our interview respondents spoke directly about the quality of CFIA enforcement activities. With respect to the enforcement of provincial standards, one respondent suggested that additional funding and staffing is necessary to ensure full compliance by producers in Nova Scotia, many of whom raise and slaughter livestock for personal use and are therefore difficult to monitor (FI 7). In Alberta, compliance with traceability standards varies by value chain; in particular, participation by cattle producers in voluntary programs is low (FI 11).

For private standards, enforcement is conducted by third-party certification organizations that conduct inspections and verify compliance (Fagotto, 2014). According to Hayburn, third-party audits are a major component of the overall food safety regime because of shortages in “regulatory skills and people ... increasing consumer demands and a rapidly evolving food safety risk landscape” (2014: 197). The integration of private standards into public statutes means government inspections often serve as a compliance mechanism for both types of standards. Compliance with private codes of practice presents an opportunity for government regulators to “distinguish between high and low risk establishments and focus inspection efforts accordingly” (Garcia Martinez *et al.*, 2007: 311). CFIA has acknowledged, for example, that government certification to “private schemes has potential to be used as a factor within a risk-based model allocating regulatory resources” (Canadian Food Inspection Agency, 2014b: 5). This sort of reverse capture may be problematic for small firms, which may not have the financial capacity or technical expertise to adhere to costly programs intended for larger operators (Garcia Martinez *et al.*, 2007: 311).

When a food risk to human health is identified, a recall may be initiated. Since 2006, there have been 200 to 300 food recalls each year in Canada (Auditor General of Canada, 2013). The CFIA is responsible for coordinating food recalls. The decision to initiate a recall, however, is made by the implicated firm. The success of a recall depends to some extent on the traceability of the affected product (FI 3). The Auditor General of Canada recently conducted a performance audit of the food recall system. The audit concludes that the first stages of the recall process – from when an issue is identified to when a recall decision is made – “are generally working well” (Auditor General of Canada, 2013: 2). Problems, however, were identified with the decision-making procedures used during an emergency response (i.e. a high risk recall), which are not well understood by Agency staff. The Auditor General also identified weaknesses in CFIA’s follow-up after a recall. The report describes as inadequate the monitoring and documentation used by CFIA to ensure that an affected product has been properly corrected or disposed of (Auditor General of Canada, 2013: 15-16).

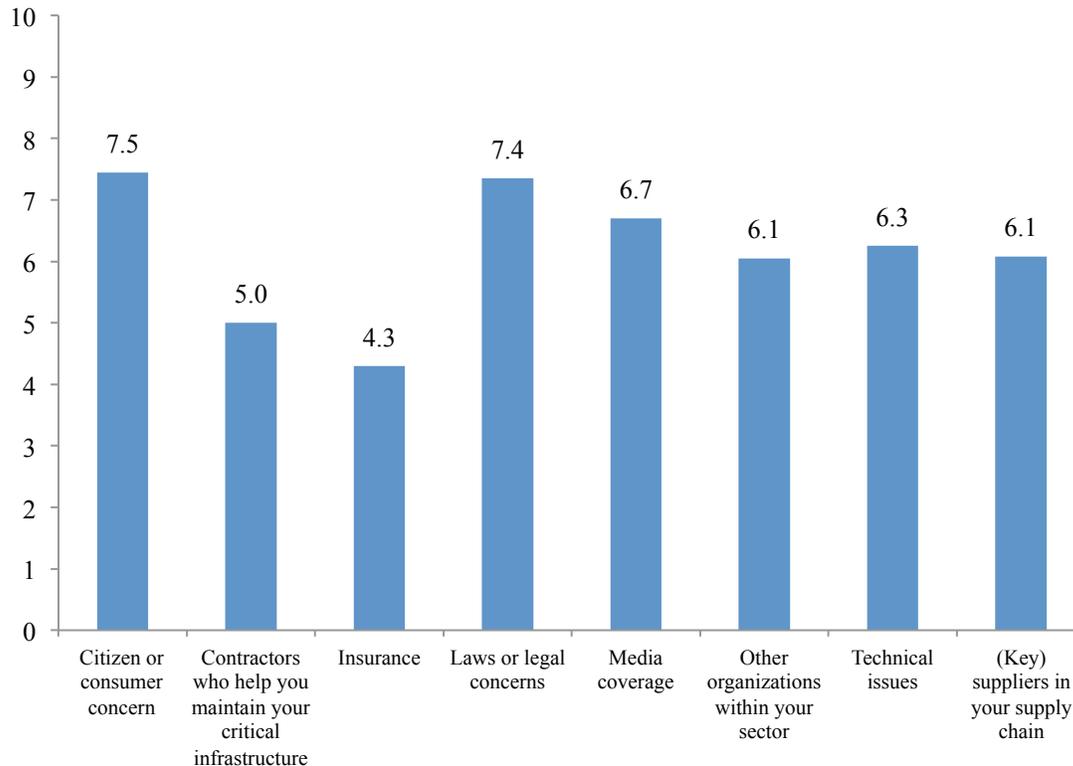
In addition to enforcing standards, behaviour modification in the food supply chain includes government efforts to affect consumer behaviour, for example with respect to properly cooking meat. Consumer knowledge and behaviour appear to vary across commodity types. Pork tends to be overcooked by most consumers (FI 7), whereas fish and seafood products are often handled with less care (FI 3). This lack of knowledge becomes particularly problematic during food shortages, such as those caused by natural disasters. An Australian report on the effects of flooding in Queensland notes that younger people were disproportionately affected because many “lived in apartments where there was limited storage space for food” and because they “did not know how to cook anything other than pre-prepared meals (which became unavailable during the flooding)” (Australia. Department of Agriculture, Fisheries and Forestry, 2012: 33). Evidence suggests that similar food storage and preparation habits are common among Canadians. Although there is insufficient data to determine conclusively whether food preparation skills are in decline, it is clear that actual consumption patterns are changing “in step with the increased availability of processed foods” (Conference Board of

Canada, 2013: 18). It is therefore reasonable to assume that some Canadians would experience similar challenges with respect to accessing and preparing fresh food during a major disruption of the food supply chain.

Consumer concerns are a significant issue for participants in the food supply chain. Interview respondents emphasized that a food incident could have negative repercussions for public perception of an entire commodity sector (FI 6; FI 7). When given a list of contextual issues relevant to our framework and asked which ones influence the manner in which they spend their time with respect to safety and security, interview respondents scored citizen or consumer concern higher than any other issue. Next highest were legal concerns and media coverage. Our interview participants reported being less influenced by insurance, contractors or other organizations in their sector. These results suggest concern primarily with larger, societal-level forces such as public opinion and the media rather than the behaviour of their peers or competitors.

**Figure 3: Perceived influence of various subjects on safety and security practices<sup>8</sup>**

*This figure illustrates mean responses from food supply interview participants to the question: “How would you rate the influence of the following subjects on how you spend your time with respect to matters of safety and security?” (n=8; based on a 10-point scale in which 10 means ‘very influential’ or ‘very demanding’ and 1 means ‘not at all’ or ‘I spend little time thinking about it’).*



In sum, information sharing in the regulatory regime for the Canadian food supply chain comprises a mix of horizontal and vertical mechanisms, which range from information-sharing forums to formal inspections. The technical sophistication of traceability systems across the supply chain continues to improve, enhancing the quality of data available to the CFIA and other agencies. Information sharing within industry is facilitated by a non-competitive attitude towards improving food safety. Information sharing on non-safety hazards, however, such as security and natural disaster planning, is minimal. Standards for the food supply chain are rule-oriented, extensive and aggressive, and emanate from both public statutes and private codes of practice. The line between public and private regulation is becoming increasingly blurred, and some private programs have been integrated into government standards. International factors, such as trade liberalization under the WTO and the consolidation of retailers, serve as a key influence on private standards. As with information sharing, most standards address food safety issues; there

<sup>8</sup> The small sample size in Figure 3 would preclude the use of any rigorous statistical analysis to support generalizations of the findings. We present the data as indicative of the relative importance of the contextual influences as assessed by these individual interview subjects and use it as a departure point for analysis and discussion. Please see Appendix B section for further discussion on this approach.

are fewer standards on business continuity and natural disaster preparedness. Behaviour modification is achieved through a combination of public and private tools, including product recalls and inspections. Overall, the control mechanism is characterized by systemic complexity, proactivity and a high density of formal regulatory rules, with a distinct emphasis on food safety over other risk types.

#### **4.4. Canada in Comparative Perspective**

Although, as noted above, standardization is occurring across the global food supply chain, both our interview data and the academic literature indicate that the Canadian regime remains unique in several respects. First, there is a sense that the Canadian food supply is among the most extensively regulated in the world (FI 3). Canada is also thought to possess one of the world's most effective food safety regimes (FI 12). Despite the growing influence of private codes of practice, public standards continue to exert a greater influence in Canada than, for example, in Europe (Garcia Martinez *et al.*, 2007; Hobbs *et al.*, 2002). In the UK, private standards are deeply integrated into the public regulatory scheme, in part due to retailer market power and the collaborative orientation of the EU regulatory environment (FI 5; Garcia Martinez *et al.*, 2007).

A noticeable difference is also evident between Canada and the U.S., particularly with respect to the preference for both market-oriented and legal mechanisms. The U.S. food sector is, according to some, more competitive (FI 5), and market solutions to risk management are preferred over traditional, top-down methods, which are seen as a last resort (Garcia Martinez *et al.*, 2007: 312). Given Canada's export-oriented economy, meeting international (and primarily American) standards is a key objective for both governments and producers, whereas internal, domestic pressures are the primary concern for American producers (Hobbs *et al.*, 2002). Further, the institutional structure of the American system, in which the courts play a significant role in regulating firm behaviour, means the U.S. regime relies heavily on "tort and market mechanisms, in addition to government's efforts" (Brewster and Goldsmith, 2007: 36). Canada's Westminster parliamentary system, in comparison, arguably supports a more prescriptive regulatory approach.

Similar differences also extend to information gathering. In Canada, Australia and the UK, there is evidence of closer collaboration between industry and government in terms of information sharing than in the U.S. (FI 4; FI 5; FI 6). Compared to Canada, however, Australia appears to be more advanced in terms of industry-government collaboration with respect to emergency and business continuity planning, as evidenced by the degree of integration achieved through the Trusted Information Sharing Network (TISN) (FI 4; FI 8). Australian respondents expressed more concern about security risks to the food supply, including terrorism, than Canadian and British respondents, who noted that food safety, including unintentional contamination and animal health, remains their primary concern (FI 5; FI 7; FI 8; FI 10).

## 5. Regime Context

Having defined the content of the food supply regulatory regime, we next turn to an analysis of its context. In the following section we identify the factors that help to explain content by introducing the second major component of the Hood *et al.* framework.

### 5.1. Market Failure Hypothesis

The first hypothesis, the *Market Failure Hypothesis*, assumes that government intervention in the market is necessary given the technical nature of the risk and the inability of the market to manage the risk effectively without such intervention. Most economic arguments for government intervention are based on the idea that the marketplace cannot provide public goods or respond appropriately to externalities. Public health and welfare programs, education, roads, research and development, national and domestic security, and a clean environment all have been labeled public goods (Cowen, 1993).

The Market Failure Hypothesis (MFH) posits that the content of a regime will reflect the extent to which markets fail to operate as regulators of socially unacceptable risk. As Hood *et al.* (2001: 70) emphasize, MFH assumes that, “in a liberal-capitalist society, government will experience pressure to restrict its economic interventions to the minimal response necessary to correct market failures.” To evaluate the validity of a market failure explanation of regime content, one must examine the capacity for the market or tort laws to regulate a risk effectively. One must also identify how aggressively government is trying to regulate the risk. If the market is found to be an ineffective regulator but government has *not* intervened then MFH provides an unsatisfactory explanation of the regime. On the other hand, if government intervention is occurring in light of a clear market failure, then MFH offers a useful framework for interpreting the regime.

Hood *et al.* introduce two concepts to guide their analysis of MFH, information costs and opt-out costs. Information costs are costs “faced by individuals in their efforts to assess the level or type of risk they are exposed to,” whereas opt-out costs are the individual or collective costs of reducing exposure to a hazard (Hood *et al.*, 2001: 73). If the market failure approach to risk regulation is followed, then regulatory size will be substantial only for risks where opt-out costs and information costs are high, and only for the specific control component that is affected by high costs. Conversely, if both information and opt-out costs are low, then MFH would lead us to expect regulatory size to be small. If information costs were high but opt-out costs were low, market failure logic suggests regulatory size would be high for information gathering but low for behaviour modification. If information costs were low but opt-out costs were substantial, regulatory size would be low for information gathering but high for behaviour modification. Figure 4 summarizes Hood *et al.*'s expectations of an approach to regulation dictated by the logic of market failure.

**Figure 4: Market failure explanation of regime size**

Source: Hood *et al.* (2001: 74)

		Cost of obtaining information on exposure to risk	
		Low	High
Costs of opting out of exposure to risk by market or contractual means	Low	Minimal regulation	Regime content high on regulatory size for information gathering, with behaviour modification through information dissemination
	High	Regime content high on regulatory size for behaviour modification	Maximal regulation

The complexity of the food supply chain means information costs related to food safety are high for consumers. For a typical meal, it would take considerable effort for a consumer to obtain accurate information about the source and quality of each food item. Moreover, without access to sophisticated equipment, it is impossible for consumers to know if their food contains harmful biological or chemical contaminants. In economics terms, there is an information asymmetry that widens as one moves along the supply chain from producers to consumers. Information costs are also high with respect to risks that threaten the food supply infrastructure, such as terrorism and rare natural disasters. These types of low-probability, high-consequence phenomena are difficult to predict due to insufficient reliable data, limited predictive models and technologies and, in the case of terrorism, a reactive human enemy.

Opt-out costs, in comparison, vary across the supply chain. For consumers, there are no market-based solutions for opting out of risks that affect the food supply as a whole, short of reverting to subsistence farming. For large-scale hazards, such as natural disasters that affect the distribution infrastructure, the market therefore offers few options. As a mechanism for affecting the behaviour of individual firms, however, the market provides consumers with significant leverage. As illustrated in Figure 3, our interview participants ranked citizen and consumer concern as the most significant influence on their security and safety practices. This is due in part to the substitutability of most food products. If consumers perceive one brand or commodity type to be unsafe, then there is little cost involved in switching to another brand or commodity. Interview participants emphasized that animal diseases (e.g. BSE and foot-and-mouth disease) and food contaminants (e.g. listeriosis and *E. coli*) are among their most significant risks because detection of these substances could translate into significant financial losses (FI 2; FI 5; FI 6; FI 7; FI 8; FI 10). Closure of the Canada-U.S. border as a result of animal health or food contamination issues represents a worst-case scenario that would be ‘devastating’ for industry (FI 6; see also Garcia Martinez *et al.*, 2007: 312). In 2012, Canada exported \$47.7 billion worth of

agri-food and seafood products around the world. The value of exports to the U.S. was \$23.6 billion, or effectively half of Canadian agricultural exports.

Economic analyses suggest that product safety disasters tend to cause significant short-term financial losses for firms. In the 25 days following the 1982 Tylenol poisonings, for instance, Johnson & Johnson stockholders lost in excess of \$2.3 billion (Dowdell, Govindaraj and Jain, 1992: 299). Jin and Kim, in a study on the effects of the 2003 BSE outbreak, find that in the ten trading days following announcement of the discovery of BSE, firms in the beef industry were “significantly, negatively affected, but other meat industries *benefited significantly*” (2008: 357; emphasis added). During the 2006 *E. coli* outbreak, the U.S. Food and Drug Administration announced that consumers should avoid consuming bagged spinach, leading to a \$205.8 million drop in consumer spending on spinach and a rise in spending on substitutes such as salads without spinach and bulk iceberg lettuce (Arnade, Calvin and Kuchler, 2009). In a master’s thesis, Smart similarly finds that in the 11 days following announcement of the Maple Leaf Foods listeriosis outbreak, share value return estimates for that firm were “negative and statistically significant” (2010: 93). Salin and Hooker study four food recalls in the United States between 1996 and 1998. They find that although financial markets reacted in all cases, the responses were more severe for small firms than large firms (Salin and Hooker, 2001: 44).

Together, these studies also point to the potential importance of effective crisis management and public relations, particularly for the long-term rehabilitation of financial value and reputation. Although firms tend to experience steep losses in the immediate aftermath of food safety failures, over the long term, firms that are perceived to handle the crisis effectively tend to recoup their losses (assuming, of course, the firm was large enough to withstand the initial financial shock). The response by Maple Leaf Foods, for example, is widely seen as a model for “good practice in crisis communication management” (Howell and Miller, 2010: 53); it is therefore unsurprising that within six months the firm’s share value had returned to pre-crisis levels (Tattie, 2009).

The economics of the global food supply chain cause industry, and particularly small and medium-size enterprises, to be vulnerable to distant shocks. Firms are often integrated into long, transnational supply chains, which makes them acutely susceptible to even minor macroeconomic fluctuations. Australian and Canadian interview participants said that a rise in their respective currencies represents a key risk (FI 4; FI 7). A rise in global inflation rates could also have a major effect given the significant proportion of income spent on food (FI 10). Beyond these factors, firms must also contend with intense competition throughout the supply chain. Industry is consequently faced with balancing numerous and competing market pressures. Overall, the presence of a competitive market combined with low transaction costs for substituting between products makes possible a form of bargaining similar to that envisioned by the Coase Theorem (Rosen *et al.*, 2012: 72). In short, with respect to opt-out costs, the market appears to be working reasonably well.

Tort-based solutions also appear to function effectively. Following the 2008 listeriosis outbreak, for example, Maple Leaf Foods agreed to pay \$27 million to settle class-action lawsuits (Mason, 2009). A recent white paper by the law firm Osler, Hoskin & Harcourt emphasizes that, in Canada, “food products have become subject to increasingly frequent and increasingly costly litigation” (2014: 3). Further evidence for this conclusion comes from Figure 3, which highlights the emphasis placed by our interview respondents on laws and legal concerns. These concerns were in fact rated second highest after citizen and consumer concerns. Although Canada remains less litigious than the United States, when food safety crises do occur, Canadians are using civil law mechanisms to hold companies to account and to extract financial compensation.

Yet elsewhere in the supply chain, neither market nor tort law processes lowers opt-out costs. The intentional contamination of food products by malicious actors cannot be easily addressed through these mechanisms. This is also the case for natural disasters. There is little incentive for companies to invest in preparations for low-probability risks. Unless prompted, most of our interview participants did not address terrorism. When it was discussed, participants agreed that the sector is less concerned with terrorism than other risks, such as food-borne illnesses or unintentional chemical contamination (FI 10; FI 11).

The food supply chain therefore exhibits high information costs and a mix of low and high opt-out costs. According to MFH, the regulatory regime should be focused on facilitating information sharing and, where opt-out costs are high, modifying behaviour. The regime conforms to these predictions in some areas, particularly with respect to information costs. As described above, the regime contains several information-gathering and information-sharing mechanisms, including inspections and both horizontal and vertical forums. Government’s emphasis on improving transparency represents a response to the information asymmetries identified above, which is in line with the predictions of MFH.

Continued efforts to improve traceability across the country also underscore the regime’s focus on enhancing the availability and quality of food safety information. Although traceability systems serve an *ex post*, or after the fact, function, they have the added benefit of lowering opt-out costs by improving tort liability law. By facilitating identification of the source of unsafe food, traceability systems incentivize firms to improve their safety practices in order to avoid civil legal action (Hobbs, 2003a).

To be sure, our interview participants emphasized that further improvements are needed to the regime’s information-gathering component (FI 2; FI 3; FI 6; FI 7; FI 9; FI 10; FI 11). In particular, they called for greater communication from CFIA to industry members (FI 6; FI 7; FI 9; FI 10), and for improved efficiencies with respect to how government departments and agencies share information with one another (FI 6; FI 11). One interview participant, for example, warned that CFIA and Health Canada continue to operate in ‘silos’, and that better coordination between these agencies would improve the responsiveness of the regime (FI 6). This does not refute the MFH, which emphasizes quantity rather than quality. In other words, that government risk regulation practices are

inefficient, uncoordinated or opaque is not evidence that government is pursuing a non-interventionist policy. A market failure logic may be at play even if government regulatory efforts are poorly executed.

MFH is also useful in explaining the prevalence of private standards in the area of food safety. Here, market dynamics and civil law institutions are efficient at generating the socially optimal level of food safety. There is no reason for government to intervene, because there is little evidence that government standards would fare better than private ones. Of course, private standards do fail from time to time, causing food safety crises. In these cases, governments in Canada have shown a willingness to intervene. The 2008 listeriosis outbreak, for example, was followed by establishment of a public inquiry and the subsequent overhaul of the federal food inspection regime through passage of the *Safe Food for Canadians Act*, which will come into effect in 2015.

MFH is less persuasive in explaining the absence in Canada of attention to low-probability/high-consequence risks. As noted above, our interview participants suggested that terrorism and natural disasters are generally dealt with at the individual firm level. There is little coordination by either government or industry with respect to supply chain-wide planning for these hazards. This is notable given the attention to bio- and agro-terrorism in the United States, where the Department of Homeland Security plays an active role in developing “programs directed toward protecting against a terrorist threat to ensure the safety of the nation’s food supply” (Henry, 2012: 224), as well as Australian efforts to improve the resilience of that country’s overall food supply chain (Australia. Department of Agriculture, Fisheries and Forestry, 2012).

Comprising a wide and diverse range of economic activities, the food supply chain thus presents high information costs and both high and low opt-out costs. High information costs stem from the impracticality for consumers to obtain accurate information about distantly sourced food, as well as the absence of reliable data about certain low-probability risks. These risks similarly present high opt-out costs, because they hold the potential to cause large-scale disruptions to the distribution of food. On the other hand, consumers hold significant power through the market over individual food commodities and brands. Opt-out costs, in other words, are low because of the substitutability of most food products. In light of these dynamics, the Market Failure Hypothesis appears to offer a strong account of government efforts to implement information gathering and dissemination processes, including robust traceability mechanisms. The efficacy of existing market and civil law processes for dealing with some opt-out costs also helps explain the prevalence of private rather than government food safety standards. MFH is less convincing, however, in accounting for the relative absence of regulatory attention towards low-probability/high-consequence risks, for which there are few market or legal options for reducing opt-out costs.

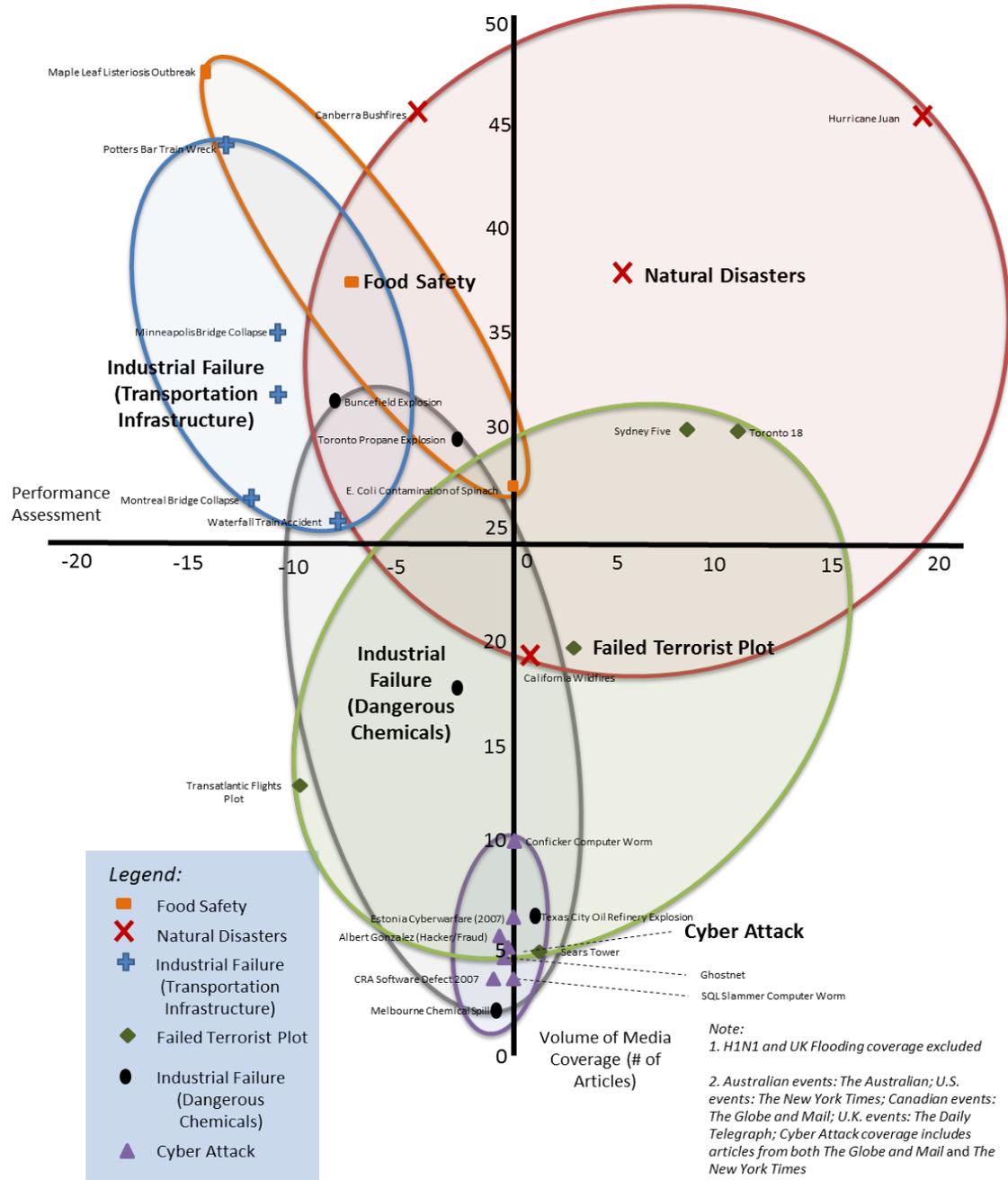
## 5.2. Opinion-Responsive Hypothesis

The *Opinion-Responsive Hypothesis* (ORH) states that a risk regulation regime is a certain way because that is how those affected by the risks, or the cost of reducing the risks, want it to be (Hood *et al.*, 2001: 90). According to this perspective, regime content reflects public preferences and attitudes. As we argue below, ORH is a useful complement to MFH in explaining government attention to information gathering. In addition, by highlighting public concerns about food safety, ORH explains industry's willingness to voluntarily adopt stringent standards.

The availability of newspaper and media archives on the Internet enables us to draw on empirical data for our analysis. Here, we borrow from Hood *et al.*, who similarly use media coverage to gauge not public opinion *per se* but rather the flavour of public debate not least because leaders in civil society read these news sources. Figure 5 is the result of a study of media coverage of selected CI events that have occurred since 9/11. It shows the volume of media coverage on the Y-axis and government performance assessment (as determined by the media) on the X-axis. The food supply incidents in the study are the 2008 listeriosis outbreak and the 2006 *E. coli* contamination of spinach.

**Figure 5: Assessment of government performance and volume of coverage for selected events**

Source: *The Australian, The Globe and Mail, The Daily Telegraph, The New York Times*



We have to be cautious when interpreting media coverage. Researchers have noted the media's propensity to report the dramatic over the common but more dangerous (Soumerai *et al.*, 1992), their tendency not only to sensationalize (Johnson and Cavello, 1987) but also to sensationalize the most negative aspects of events (Wahlberg and Sjoberg, 2000). Moreover, the number of events is relatively low – particularly in the case of food safety – and therefore we have to be careful about conclusions we draw. Finally, the two food safety events are the result of accidental contamination rather than malicious intent, which can further influence the type of coverage.

Notwithstanding these cautionary notes, some patterns are evident in Figure 5. The two food safety events received relatively high volumes of coverage. There is a high degree of variability with respect to assessment of government: the 2008 listeriosis outbreak produced the most negative coverage of all events studied whereas the spinach contamination crisis generated neutral coverage of government performance. In the listeriosis case, the critical tone of the coverage was exacerbated by the perception of conflict between levels of government. Thus, overall, compared to other risk types, food safety emergencies appear to produce a high degree of media coverage that is either critical of or, at best, ambivalent about government.

As Hood *et al.* emphasize, the market failure and opinion-responsive hypotheses often overlap because “markets are conventionally regarded as discovery systems for establishing individual preferences, within a given distribution of income; those concerned to correct market failures often seek to find surrogates for such discovery, notably by willingness-to-pay studies” (2001: 64). This sort of overlap appears to be present in the case of food safety. There is evidence in our interview data and the academic literature that public concern about food quality is a key influence on firm behaviour. According to Martin, Ostry and MacDonald, pressure for food safety regulation comes from the market, often in “response to ‘food scares’ and value-based risk assessments by the purchasing public” (2010: 1). Market signals provide an incentive for firms to implement stringent standards voluntarily (Fares and Rouviere, 2010).

The psychometric paradigm in the psychology literature provides an explanation for public attitudes on food safety risks. According to this paradigm, risks are conceptualized as personal expressions of individual fears or expectations. Individuals respond to their perceptions whether or not they reflect reality. The psychometric approach seeks to explain why individuals do not base their risk judgments on expected values, as rational actor advocates would suggest (Jaeger *et al.*, 2001: 102-104). The approach has identified several biases in people's ability to draw inferences. Risk perception can be influenced by properties such as perception of dread (Slovic *et al.*, 1982), personal control (Langer, 1974), familiarity (Tversky and Kahneman, 1973), equitable sharing of both benefits and risks (Finucane *et al.*, 2000) and the potential to blame an institution or person (Douglas and Wildavsky, 1982). It can also be associated with how a person feels about something, such as a particular technology or a disease (Alhakami and Slovic, 1994). People show confirmation bias (Wason, 1960), which suggests they seek to affirm their beliefs, not challenge them. People can also be vulnerable to probability neglect (Slovic *et al.*, 2005), which is at work when, “people's attention is focused on the bad outcome itself, and they

are inattentive to the fact that it is unlikely to occur” (Sunstein, 2003: 122). Sandman (2012) proposes a model to explain public perception of risk as a function of two components, hazard and outrage. The former refers to the technical expert risk assessment of the event while the latter refers to the emotional reaction people have concerning the event. Sandman lists 20 characteristics of events that affect the magnitude of outrage, many of which can be identified in the events noted above.

This literature provides a helpful framework for analyzing the role of public opinion in food safety regulation. Widespread interest in this topic dates back at least to the publication in 1906 of Upton Sinclair’s *The Jungle*. Renewed public concern over food safety emerged in Britain following confirmation in 1986 of BSE in cattle (Pidgeon, Kasperson and Slovic, 2003). In North America, public opinion polls have registered growing concern about food safety issues since at least the early 1990s (Finn and Louviere, 1992). Academic research confirms that this interest is motivated by psychological and social factors, rather than rational calculations. For example, in the case of BSE, the death of a housecat from a variant of the disease triggered heightened public alarm; Pidgeon *et al.* quote a food industry representative who notes that “[e]verything would have died down had it not been for that bloody Siamese cat” (2003: 144). Consumers also tend to be concerned about the application of technology to food production, and the effects of hormones, pesticides, antibiotics and genetic modification (Holm and Kildevang, 1996; Miles *et al.*, 2004; Wilcock *et al.*, 2004). As Siegrist notes, it is therefore “not a coincidence that food products are often associated with nature” in advertising (2008: 604). Risk perception regarding food safety is also explained by household income, number of children, age, voting preferences and particularly gender (Dosman, Adamowicz and Hrudehy, 2001).

Indeed, consumer risk perception is often informed by our feelings about risk rather than by empirical data about the consequences of certain risks. Verbeke *et al.* contrast people’s acceptance of commonly enacted high risk behaviours and people’s aversion to industrial interventions or contaminations in food supply, for example:

[d]iet- and lifestyle-related heart and coronary diseases, as well as lung cancer from smoking, represent relatively large risks, which are, however, largely disregarded by some consumers. At the same time, emerging food-processing technologies or food-borne illnesses caused by chemical contamination are examples of overestimations of relatively small actual risks (2007: 3).

This is not to say that food contamination does not cause significant harm in certain cases. Beyond widely publicized food safety emergencies (such as those described above), thousands of people are affected by food illnesses every year. Between 2000 and 2008, 31 major pathogens “acquired in the United States caused 9.4 million episodes of foodborne illness ... 55,961 hospitalizations ... and 1,351 deaths” per year (Scallan *et al.*, 2011: 7). Yet the emotional significance attached to food-related hazards means that public reaction to ‘food scares’ may be disproportional to the harm caused. Even where no fatalities are recorded, the perceived potential for the transmission of contaminants through the supply chain means public reaction to food-related events can be severe.

Martin *et al.* write that the media response “to food scares has caused officials to resign and regulations to be imposed regardless of actual risk to the health of the public” (2010: 1).

As illustrated in Figure 3, our interview respondents identified citizen and consumer concerns and media coverage as two of the three biggest influences on how they spend their time on safety and security. Interestingly, although citizen and consumer concern scored the highest average among participants, there was considerable variability among individual responses. Whereas some interview participants were adamant that consumer demands for enhanced safety are central to understanding the regulatory regime (FI 3-5; FI 9), a distant, third-party observer suggested that consumers are largely uninterested in food safety issues and are generally unwilling to pay for additional security (FI 12). One possible explanation for this discrepancy is methodological: participants, in other words, may have interpreted the question differently. In particular, it may be that on a day-to-day basis, agricultural producers have little interaction with the public, dealing instead with contractors, technical issues, legal requirements, insurance providers and so on. From this perspective, consumer concern would be a low-level concern relative to other factors. Still, this fact is not irreconcilable with the idea that following a major food safety or security disaster, public attention would likely focus on the need for improved safety or security practices. Regulatory change would therefore be driven by consumer demand for a better regulatory regime. In short, that actors in the food supply chain do not think about consumer concerns daily does not refute the possibility that their regular safety and security routines were in fact the product of pressure from consumers.

Overall, then, ORH serves as useful complement to MFH in explaining government attention to information gathering on food safety risks, particularly in the area of traceability. ORH also explains the prevalence of private standards by underscoring why industry is sensitive to public concerns about food quality. For industry, maintaining the perception that the food supply is safe is as important as ensuring this is actually the case.

A potential challenge for industry is that consumers may find producers, processors and retailers to be less trustworthy sources of information regarding food production than government. A study by Hobbs (2003a), for example, which canvassed 204 consumers in Saskatchewan and Ontario, found that more than 40% of respondents in both provinces trusted the federal government the most whereas less than 10% of respondents trusted industry groups the most. Hobbs notes that one potential solution for industry is to build “individual branding and product assurances into a nationally accredited identification and quality verification system” (2003a: 46).

Compared to MFH, ORH may be more useful in explaining the absence of regulatory attention to major hazards such as terrorism or natural disasters, which threaten the resilience of the supply chain as a whole. Specifically, ORH emphasizes the role of the availability heuristic, which is the notion that people’s assessment of a risk is influenced by the ease with which they can recall relevant instances of that risk materializing (Tversky and Kahneman, 1973). Most Canadians have not experienced a major disruption in their access to the food supply chain. Food security is a significant issue in

northern Canada, but this affects only a small proportion of the national population. Food security is also certainly an issue for low-income Canadians, but this is due to issues of income rather than the resilience of the supply chain infrastructure. Therefore, the absence of public concern about attacks on the Canadian food supply chain or its vulnerability to natural events may be due to the infrequency of these events in recent Canadian history. This also explains heightened attention to the effects of extreme weather in Australia, which since 2010 has experienced at least two significant disruptions to its food distribution system (see Bradbear and Friel, 2013).

From a comparative perspective, ORH may also explain in part why food safety and security regulatory regimes differ across countries. Consider, for example, the cultural significance of food and cuisine to France. “Of all the components of French cultural identity,” write Gordon and Meunier, “food may be one of the most universally recognized internationally and one of the greatest sources of pride domestically” (2001: 30). As Echols notes, the desire to maintain traditional food production and processing techniques in Europe has created “scepticism of new technologies ... [which] has slowed the [European Union’s] broader regulatory process as well as particular governmental approvals” (1998: 526). The importance attached to protecting traditional methods for making, say, certain French cheeses, implies a trade-off between food safety and cultural heritage. In the case of France, the cultural salience of unpasteurized cheese is associated with a higher public tolerance for the safety risks inherent in consuming raw milk (see Hesser, 1998). The importance of food as a national icon was underscored in 1999 by the dismantling of a McDonald’s restaurant by the French farmer and activist José Bové. Combined with recent high-profile food safety disasters, such as BSE, the cultural salience of food has produced a highly politicized and contested regulatory system in Europe (Ansell and Vogel, 2006).

In sum, the Opinion-Responsive Hypothesis emphasizes how public attitudes about the safety and security of the food supply chain are informed by psychological assessments of food-related risks. The academic literature suggests that consumers often adopt an emotional rather than purely rational perspective on these risks, focussing disproportionately on hazards related to contamination and the application of modern technology to food production. Although these types of hazards are potentially harmful, the probability of being affected by them is relatively low, particularly compared to risks related to the habitual consumption of unhealthy food. ORH is useful in this respect because it explains government attention to traceability systems, which are intended to help address food safety and contamination issues. MFH and ORH are thus complementary, because heightened public concern is often directly manifested in the market when consumers choose not to purchase commodities or brands that they perceive to be unsafe due to a high profile failure associated with the commodities in question. ORH is additionally complementary because it offers insight into the absence of regulatory attention toward food security hazards, which is explained to some extent by the availability heuristic. Despite their rarity, the minimal attention paid to these risks by government and CI operators exposes what the 9/11 Commission calls a failure of imagination (National Commission on Terrorist Attacks Upon the United States, 2004). It is possible, in other words, that the Canadian food supply chain could be the target of a

major attack, but the regime itself spends little time reflecting or preparing for this possibility; the absence of a high profile precedent reinforces this regime orientation. When they do occur, however, these events can have major implications for the regime, leading to institutional re-arrangements of the kind witnessed in the UK after BSE and in Canada after listeriosis.

### 5.3. Interest Group Hypothesis

The third hypothesis presented by Hood *et al.* attributes regime content to interest group pressures. As Hood *et al.* note, “various components and elements of regimes can be shaped by different organized interests” (2001: 131). Political pressure of this sort can be difficult to study, given that public campaigns to influence policy are often complemented by informal, subtle or otherwise discreet lobbying efforts. The *Interest Group Hypothesis* (IGH) necessitates an inferential approach, in which the preferences of relevant interest groups are assumed to be revealed by their function and observable behaviour. In the context of regulatory analysis, IGH directs our attention to the degree of alignment between these preferences and regime content, and where clear alignment *is* detected, interest group pressure can be said to explain the regime. This is particularly true where regulatory policy is contested by multiple organized interests; here, alignment between content and preferences suggests that one group was ‘victorious’ and therefore better organized and more powerful than others.

Another way to conceptualize interests is to study the benefits and costs of regulations. IGH suggests that the concentration or diffusion of costs and benefits will affect the desire by an interest group to influence policy. According to the Stiglerian, or Chicago School perspective, business interests are often “the best-organized group in the policy domain” because their “fortunes could be affected by price control or restrictions on entry to their markets” (Hood *et al.*, 2001: 65). Regulatory capture occurs when these interests are successful in shaping the behaviour and decisions of regulators. Yet non-business groups also attempt to influence government. Animal rights groups, for example, lobby governments to improve livestock living conditions (FI 6). Hood *et al.* also contend that regulators themselves may function as an organized interest group. Although financial profit is not at issue, the economics and public administration literature highlights several other benefits that regulators may seek to maximize, such as their departmental budget (Niskanen, 1971), job satisfaction (Dunleavy, 1991) or fulfillment from seeing personal preferences reflected in policy (Downs, 1967). In sum, the interest group approach posits that the presence of well-organized interest groups in a policy area can be explained by examining how regulation affects the benefits and costs accrued by those groups.

Drawing on James Wilson’s seminal book, *The Politics of Regulation* (1980), Hood *et al.* illustrate IGH using a two-dimensional matrix, reproduced below.

**Figure 6: Interest group explanation of regime content**

Source: Hood *et al.* (2001: 122)

		Distribution of <b>benefits</b>	
		Diffuse	Concentrated
Distribution of <b>costs</b>	Diffuse	Majoritarian politics	Client politics
	Concentrated	Entrepreneurial politics	Interest group politics

Each quadrant in the matrix corresponds to a specific type of regulatory politics. When both benefits and costs are diffuse, the matrix predicts the presence of what Wilson (1980) calls majoritarian politics. The wide distribution of both benefits and costs means no group stands to gain from regulation and no group stands to lose. As an example, Wilson highlights the *Sherman Antitrust Act*, which affected every business operating under U.S. jurisdiction and was sufficiently vague that “any given firm could imagine ways in which these laws might help them” (1980: 368). But since no specific *sector* stood to benefit, the Act received little organized business support. IGH overlaps with ORH in this situation, since the absence of organized interests means legislators craft regulatory content in light of prevailing public opinion.

The opposite situation, where both benefits and costs are highly concentrated, produces interest group politics. This situation tends to arise when a proposed regulation threatens to benefit one set of business interests at the expense of others. Hood *et al.* use as an example the imposition of vehicle safety-enhancements, which may benefit “vehicle manufacturers whose markets may be protected or enhanced by such measures” while harming others, such as “vehicle fleet operators or truckers whose costs may be raised” (2001: 114). Where competition over regulatory outcomes involves multiple groups – including civil society actors, such as vehicle safety activists – with roughly equal access to decision-makers, the policy space reflects the archetypal pluralist model of democracy (for example, Truman, 1951). The uneven distribution of resources, however, means regulatory politics often resemble a polyarchy, in which the scales are weighted in favour of the expertise and resource capacity of large, well-organized business interests (Dahl, 1971). Ultimately, the key feature of interest group politics is that “whatever risk regulators do is liable to advance some business interests at the expense of others” (Hood

*et al.*, 2001: 114). The concentration of benefits and costs means some groups must win and others lose.

The top right quadrant in Wilson's matrix – client politics – occurs in the presence of regulatory capture. This situation differs from interest group politics because the diffusion of costs means no group perceives itself as losing. “[T]he costs of the [regulation] are distributed at a low per capita rate over a large number of people,” writes Wilson, “and hence they have little incentive to organize in opposition – if, indeed, they even hear of the policy” (1980: 369). Examples of client politics include the provision of subsidies by government to an industry or occupation (Wilson, 1980: 369) and the decision by government to limit the stringency of a regulatory regime, even when market failure or public opinion points to the opposite course of action (Hood *et al.*, 2001: 118).

The final type – entrepreneurial politics – exists when a widely dispersed and loosely organized group (the public, usually) benefits from regulation that incurs a significant cost on a much smaller set of interests, such as a specific industry sector. Hood *et al.* call this the ‘defeated Goliath’ pattern (2001: 116). Wilson suggests that the passage by Congress of the 1966 *Auto Safety Act*, due in large part to the entrepreneurial efforts of Ralph Nader, is illustrative of this type of regulatory politics. As with the majoritarian quadrant, entrepreneurialism in risk regulation blurs the distinction between IGH and ORH, since its success is often bolstered by industrial failure. As Wilson emphasizes, “the work of a policy entrepreneur is made easier by a scandal or crisis [and] ... such crises are most important when the regulated industry is associated in the popular mind with positive values, such as free enterprise, the accomplishments of technology, or the virtues of limited government” (1980: 371). This reflects our earlier point regarding ORH as a latent force, emerging out of major crises to disrupt ‘normal’ patterns of control, thereby creating the conditions for regulatory change.

In Canada, the food industry exhibits at first glance the characteristics of a powerful lobby. This is a function of the sector's significance to the national economy. In 1977, the Canadian food system accounted for approximately 9% of national employment (Forbes, 1985: 1). By 2013 that figure had grown to about 13%, and the sector accounted for 8% of GDP (Agriculture and Agri-Food Canada, 2013). In general, the history of Canadian agricultural policy suggests a close relationship between government and farmers. Until the early 1980s, policy-making occurred through an “associational system that ... was more comprehensive and highly integrated than that of any other division of the Canadian economy” (Coleman, 1988: 100). The literature is divided on whether this system was a neo-corporatist arrangement or a policy network (Daugbjerg and Swinback, 2012). In any case, agricultural policy was the product of dialogue between organized industry groups – primarily representing farmers – and government; in short, it resembled the *Client Politics* quadrant of Wilson's typology.

Since the 1970s, changing political and economic conditions have reshaped the policy environment, reducing in several ways the influence of domestic agricultural producers. The adoption of neoliberal reforms has reduced financial transfers to farmers and their industry organizations. The withdrawal of sustained assistance jeopardizes “the clout of

the farm lobby and its ability to establish a privileged relationship with the government ministry responsible for agricultural policy” (Skogstad, 2008: 497). According to the OECD, rates of producer protection in Canada, measured by a ratio between the average price received by producers and the border price, dropped by nearly a quarter between 1986 and 2013 (OECD, 2014). These changes reflect commitments to market liberalization made by Canada under trade agreements such as the North American Free Trade Agreement (NAFTA) and the General Agreement on Tariffs and Trade (GATT). By removing barriers to trade, governments have made domestic producers more vulnerable to global market forces. The emphasis of agricultural policy has shifted from ensuring stability for farming communities to improving the competitiveness of Canadian agricultural products in export markets (Barichello, 1995; Huff, 1997; Knuttila, 2003). Government is expanding its role as an advocate for Canadian products on the international stage, for example through ‘Team Canada’ trade missions (see Head and Ries, 2010) and the Trade Commissioner Service operated by Foreign Affairs, Trade and Development Canada (DFATD). Trade liberalization also contributes to the harmonization of standards, particularly with respect to food safety (FI 12).

New approaches to agricultural policy are also informed by continued urbanization across Canada, which has coincided with shifting public attitudes about the role of government in sustaining rural communities. Whereas rural policy was formerly characterized by an emphasis on resource management, its focus now encompasses a wide variety of social and environmental issues. Agricultural producers and primary industry stakeholders are no longer the sole organized interests in the rural policy space. Environmental groups and other non-governmental organizations are well funded and ambitious, and advocate for policies that may not always align with the priorities of farmers or the broader agricultural sector. One of our interview participants, for example, identified animal rights activists as a key threat to livestock producers because of their capacity to influence consumer preferences (FI 6). In many parts of Canada, and particularly in southern Ontario, there is also growing tension between land developers and agricultural producers. Disputes over the use of arable land further underscore the fragmented nature of interest groups in the sector and of the challenges facing government in balancing competing priorities (see Pond, 2009).

Connected to these policy reforms are structural changes in the food supply chain itself. Because of continued trade liberalization, the chain is becoming increasingly global. Over 70% of the processed food and fresh fruit and vegetables consumed in Canada are imported (Inter-American Institute for Cooperation on Agriculture, 2014). Canadian agricultural producers are integrated into long, vertical networks of suppliers and customers that span continents. In this environment, domestic producer organizations and industry associations have less clout than multinational corporations that coordinate supply chains at the international level, such as Monsanto. As Larue and Ker suggest, vertical integration means “a diminished role for marketing boards and producer associations and we will have to increasingly view farmers as entrepreneurs” (2011: 6).

Globalization has also exacerbated underlying cleavages between commodity groups within Canada. To some extent, these cleavages are longstanding, reflecting factors such

as the number of producers in a sector. Using Ontario as an example, Skogstad highlights how “a combination of a heterogeneous agricultural sector, incentives to organize along commodity lines, schisms between domestic- and export-oriented sectors, as well as other economic structural cleavages have promoted a plurality of farm groups” (1992: 333-334). Globalization has rendered these cleavages more acute by shifting the locus of power within each sector from domestic interests to foreign ones, which may have little concern for fostering a single agricultural lobby within Canada.

A prominent recent example of the potential for increased schisms between farm groups occurred in response to the Canada–European Union Comprehensive Economic and Trade Agreement (CETA). Whereas some agricultural interests, such as beef and pork producers, support CETA and are enthusiastic about the improved access it will provide for their products in the EU market, other groups oppose the Agreement because of concessions made by Canada during negotiations. The dairy sector, for example opposes the Agreement’s requirement that Canada reduce protectionist measures for Canadian fine cheeses, arguing that it will “take income from Canadian dairy farmers and their communities and give it to the European industry” (Dairy Farmers of Canada, 2013); these objections have largely gone unheeded.

The combined effect of these changes is a diffusion of power across various domestic actors. Among agricultural groups, the manner in which costs and benefits are distributed has also changed, with some interests reliant on access to foreign markets and others in favour of continued protectionism. Similar tensions are evident further along the food supply chain, although as one moves closer to consumers there is evidence of increasing consolidation; recall from above that major grocery stores exert considerable global influence over standards, for example. In any case, the point remains that trends in recent decades provide limited evidence that the relationship between regulators and the domestic food industry as a whole can be understood as an expression of client politics. To be sure, the nature of federalism means that the relationship between government and industry varies across the country. An interview participant told us that in Alberta, for instance, a corporatist arrangement exists between government and the beef industry (FI 11). An additional feature of federalism is its provision of multiple veto points, particularly on issues of shared jurisdiction. As Skogstad explains, on policy matters “in which both orders of government are involved, as either financiers or regulators, the barriers to non-incremental policy change can be appreciable” (2008: 255). Skogstad highlights this feature, among other factors, as evidence that the paradigm of agricultural exceptionalism and state assistance has not been usurped entirely by market liberalism, despite what we have argued above.

Yet even Skogstad concedes that the state assistance paradigm, although resilient, is entering a new era in which trade and other imperatives are taking on new significance. Over the past two decades, she writes, a greater array of “social and economic actors – domestic and international – have entered the agricultural and food policy community, power relationships across state and non-state actors have shifted, and governing practices have changed” (2008: 7). Whether these trends reflect adjustments to the existing paradigm or a radical redesign of the role of the state is an important issue. For

the present analysis, however, it is ultimately secondary to the question of how these changes influence the risk regulation regime: the cause of these institutional changes is less important for our analysis than their effects.

This brings us back to the Hood *et al.* framework and the interest group explanation of regime content. At issue is how the distribution of costs and benefits – and the corresponding distribution of interest groups – explains the Canadian regulatory regime. IGH is useful in this respect because it helps explain the growing global significance of private standards. To access foreign markets and international supply chains, Canadian firms have little choice but to adhere to these standards. Large, and generally foreign, corporations thus play a key role in shaping the Canadian regulatory regime, often without exhibiting traditional interest group behaviour such as lobbying government. Their widespread acceptance in the United States, Europe and other major trading partners means Canadian firms must adopt these standards as a minimum requirement of participation in the market. A similar dynamic is at play more generally in the expansion of the rules-based multilateral trade regime (i.e. the WTO), to which Canada must adhere to access the benefits of expanded and open trade.

The *Safe Food for Canadians Act* (SFCA), which will enter into force in 2015, exemplifies many of the regime's interest group dynamics. First, the Act expands government's regulatory authority with respect to controlling imports, including by licensing food importers. Trade thus represents a major focus of the Act. The legislative sponsor of the bill in the Senate, Senator Donald Plett, argued that the SFCA was designed to align Canadian laws with those of its "closest neighbours and major trading partners, not simply to protect consumers against food-borne illness, but also to promote greater opportunities for industry" (Canada. Parliament, 2012a: 2045). Of note, the United States updated its food safety regime in early 2012 through passage of the *Food Safety Modernization Act*.

Second, the SFCA provides expanded enforcement powers, including new authorities for inspectors such as the power to stop a regulated activity and to prohibit or limit access to a place (Canada. Parliament, 2012b). Once implemented, the Act will also bring in new and expanded traceability requirements. Stakeholder reaction to these changes was mixed. The Canadian Meat Council, for example, "expressed reservations about the magnitude of the increase" in fines (Canada. Parliament, 2012b: 14). Others argued that a voluntary approach to traceability was preferred, since mandatory traceability requirements "present challenges in relation to systems integration and information sharing" (Canada. Parliament, 2012b: 14).

Third, documents associated with the SFCA published by CFIA indicate that the new legislative framework provides flexibility for the recognition and potential incorporation of private standards into the regime (see Canadian Food Inspection Agency, 2014b). Together, these changes underscore that food safety mechanisms are attuned increasingly to international factors, that the federal government remains willing to intervene in the market and that standards promulgated by private bodies are important determinants of firm behaviour in the area of food safety. Implementation of the SFCA also provides a

further example of how disasters can be used by government to bring about legal or institutional changes to a regulatory regime. It underscores the maxim made famous by Rahm Emanuel, former chief of staff to Barack Obama, that one should never let a crisis “go to waste” (Fuller, 2013: 118).

IGH may also shed light on why certain risk types receive greater attention than others within the food supply chain. As noted above, terrorism and natural disasters were rarely discussed by our interview participants. One explanation is simply that these are low-probability events. The attention directed towards these risks is, from this perspective, in due proportion to the likelihood of their occurrence. A second explanation highlights the importance of maintaining access to the global supply chain. Although a terrorist attack or natural disaster could affect Canadian exports, the disruption would likely be temporary. The affected infrastructure would be rebuilt and trade would resume its normal patterns. A food safety issue, on the other hand, such as BSE or *E. coli*, could taint foreign perception of Canadian products for the long term. For instance, recall from above that we received evidence from interview participants about the critical importance of the U.S. market for Canadian exports and, consequently, the devastation that would be caused by a border closure or a shift in American attitudes about the quality and safety of Canadian agricultural products. The UK experience with BSE is illustrative: the announcement in 1996 by the British government of a link between BSE and variant Creutzfeldt-Jakob disease (vCJD), which is fatal to humans, led to “an immediate 40 per cent fall in the consumption of beef in the UK, and the complete loss of all export markets (including all Member States of the European Union) worth an estimated \$1.7 billion in 1995” (Lloyd *et al.*, 2006: 119). It seems that the massive negative consequences of a food safety failure may incentivize participants in the Canadian food supply chain to focus on safety risks above security ones.

In addition to underscoring the importance of international considerations, IGH also accounts for the varying capacity of domestic actors with respect to influencing the Canadian regulatory regime. That is, putting aside for a moment the restraints on government action imposed by trade agreements and on agricultural producers by private standards, IGH highlights the regulatory effects of the structure and arrangement of agricultural interest groups in Canada. In particular, the absence of an overarching industry association to lobby regulators on behalf of the food supply chain means that governments generally retain sufficient leeway to impose new standards as they see fit. To be sure, and to reiterate an earlier point, in some jurisdictions certain groups retain more influence than others. But viewed from a national perspective, the food supply chain is populated by a diverse and fragmented array of organized interests, which have dissimilar if not conflicting priorities. From a Wilsonian perspective, the regime is thus characterized by a form of interest group politics, in which no single group is large enough to ‘capture’ government and regulatory decisions therefore benefit some interests at the expense of others.

The Interest Group Hypothesis, in sum, draws our attention to the structure and arrangement of interest groups in Canada and the manner in which they have been affected by the globalization of the food supply chain, the liberalization of international

trade and the country's political and economic institutions. The food supply chain contains a diverse range of interest groups, with no overarching industry association capable of maintaining a corporatist relationship with government, at least at the national level. The food supply chain is also increasingly oriented toward external actors and conditions. Although always reliant on exports, Canada's agricultural producers are today integrated into global vertical supply chains to an unprecedented degree. These external actors, including multinational corporations and free trade instruments, therefore have a significant impact on the Canadian regulatory regime. Their prominence explains the widespread adoption of private standards, which are often seen as minimum requirements of doing business in foreign markets. The importance of maintaining access to these markets provides further insight into the Canadian regulatory regime's focus on safety rather than security, because the former could jeopardize the viability of Canadian commodities or brands over the long-term, whereas the latter may only cause a temporary disruption in Canadian exports.

## 6. Concluding Comments

The salient points highlighted by our analysis can be organized into two overarching themes. The first theme deals with the increasing importance of markets and competition as organizing principles for the regime. The second theme, which is notable because it is rarely addressed in the relevant academic literature or our interview data, underscores the interdependencies between the food supply chain and other critical infrastructure sectors.

In terms of the first theme, it is evident from the preceding section that the safety and security regime for the Canadian food supply chain is shifting towards a more market-based dynamic. Perhaps more than ever before, regulatory decisions are made on the basis of improving the competitiveness and efficiency of Canadian industry and promoting international trade. Our interview participants, for example, were emphatic about the overriding importance of ensuring continued access to the U.S. market for Canadian exports. The integration of Canadian agricultural products into extended, global supply chains requires that firms adopt buyers' preferred standards or be denied access to major retailers. In addition, expansion of the rules-based global trade regime provides benefits to Canadian exporters and consumers in the form of lower prices and greater product variety, but it reduces the regulatory latitude of the Canadian government.

The competitive dynamic is promoted by the inherent structure of the supply chain. The substitutability of food products serves as a form of redundancy, which improves the resilience of the overall chain. Yet it also means that when one commodity or brand is thought to be unsafe, other commodities or brands benefit. The nature of public opinion in the context of food means that firms are reliant on public confidence in the integrity of their products and the perceived quality of their brand.

The second theme underscores the extent to which the food supply chain is implicated in a broader network of critical infrastructure sectors. These sectors include transportation, energy, finance, water, government services and others, all of which are necessary for the proper functioning of the food supply chain. These interdependencies also extend to non-critical infrastructure, such as the tourism industry, which is often negatively affected by food safety emergencies. Our data, however, suggest that this fact is underappreciated by the food sector; our interview participants were largely silent on these issues.

Instead, the food supply chain appears to focus largely on the food sector in isolation. Information-sharing forums rarely include actors not directly involved in the production, distribution, sale or regulation of food products. Transportation organizations are occasionally involved in these forums, but rarely is there participation by organizations from other critical infrastructure sectors such as energy or finance. This theme also touches on issues related to the increasing centralization of the food supply chain and the concurrent proliferation of single points of failure, as well as the continued urbanization of the Canadian population, which presents new challenges due to food storage capacity issues and the lack of basic food preparation skills.

## 6.1. Implications for Emergency Management

There are few instances in recent Canadian history of major disruptions to the food supply. There are therefore limited examples of how the food supply regulatory regime behaves during low-probability/high-consequence events that affect on a large scale the quality and availability of food. This may help explain the regime's emphasis on food safety failures (which tend to affect specific commodities but not the entire chain) rather than risks such as natural disasters. This concept is also called the availability heuristic, which suggests that one's assessment of a risk is influenced by the ease with which one can recall relevant instances of that risk. In other words, because there have been few cases in recent memory of sudden and large-scale interruptions in the accessibility of food, neither government, nor industry, nor the public is motivated to devote resources to preparing for such an event in the future.

### *Market Dynamics*

Still, in light of the themes discussed above, it is possible to draw conclusions about the vulnerability of the food supply to low-consequence/high-probability events. We can also extrapolate about the regime's potential resilience to these events. One way to do so is to examine the types of behaviour incentivized by the regime's dynamics.

The shift towards a market orientation clearly incentivizes actors in the food supply chain, including regulators, to prioritize financial objectives. Of course, the food industry has always been motivated by profit. What has changed is the extent to which the broader regulatory regime is re-aligning to facilitate competition. A market-based orientation discourages firms from revealing information about their potential vulnerabilities. It incentivizes non-disclosure of information to government because there is a concern that this information could be shared with competitors, or if released to the markets, could cause a drop in share value or profit. When potential food safety issues are discovered, firms may wish to suppress details of the event – the “shoot, shovel, and shut-up” approach favoured by former Alberta Premier Ralph Klein (Rossiter, 2011: 114) – rather than report it to government.

This is potentially problematic because vulnerabilities present in one firm may be present elsewhere. By concealing their vulnerabilities, firms prevent the potential identification of sector-wide vulnerabilities, which in turn could contribute to much larger problems than one firm might realize. At the same time, a market orientation undermines the willingness of competitors to collaborate given the aforementioned financial gains enjoyed by commodities and brands when their substitutes are affected by safety or security emergencies. For example, as noted above, during the 2006 *E. coli* outbreak in the United States, spinach producers suffered financial losses when consumers switched to other vegetables.

Similarly, despite a sometimes-held view that retailers will give away food at no cost during a crisis, there is nothing to compel retailers to do so. In fact, they may choose to

stop operating altogether in order to reduce risks to employees and minimize potential liabilities. Finally, the reduced scope for regulatory flexibility created by Canada's numerous international obligations and its extensive domestic food safety regime could limit the capacity for government or other actors to access or distribute food in an emergency. In Australia, for example, regulatory requirements for trucking licenses and retail hours slowed government's response to the 2010-2011 Queensland floods (Australia. Department of Agriculture, Fisheries and Forestry, 2012: xii).

In general, market dynamics promote a rational approach to trust, in which the potential to build trust exists when actors share the same interests (Kramer, 1999; Quigley, 2013). Markets are therefore effective organizing mechanisms when both government and industry are pursuing similar objectives, such as convincing consumers of the quality and safety of Canadian agricultural products. When there is competition, however, trust is more difficult to establish. In this way, government's promotion of competition in the food supply chain creates vulnerability. It also creates a challenge for the National Strategy for Critical Infrastructure's goal of building partnerships between government and critical infrastructure owners and operators (Public Safety Canada, 2009). By facilitating a more competitive environment, the current regulatory approach to food safety and security is potentially constraining the trust and collaboration that the National Strategy advocates.

#### *Limited Awareness of Interdependencies*

The interdependence of the food supply chain, as well as the relative lack of attention to this subject within the chain itself, creates a second set of vulnerabilities. As noted above, many of these vulnerabilities relate to the long supply chains that increasingly characterize the global food system. These chains involve transportation, energy, information and communication technology (IT, or cyber), water supply and finance, as well as other sectors. The sector is reliant on labour and fuel, and is therefore vulnerable to shortages of both. A disruption in one sector could easily spill over into the food sector. A terrorist attack against a major piece of transportation infrastructure has the potential to be as disruptive (in terms of food accessibility) as an intentional food contamination. Similarly, the high rate of labour turnover in the food processing industry creates risks because new staff may lack experience and proper training (FI 13).

Moreover, a single disaster can have a cascade effect, causing failures in other sectors. For example, in addition to affecting the food supply, a natural disaster could lead to labour or fuel shortages, which in turn could exacerbate food shortages. Similarly, a pandemic spread through the food supply chain could affect the labour supply, hampering recovery efforts. In this way, the initial failure is made worse by subsequent related failures.

Given the importance of public opinion, a related concern is the amplifying effect of social media. This feature makes it difficult for government and industry to control a story once it has started. Thus, even though a food safety risk may be unlikely to have a

devastating impact on the food supply in rational terms, its potential to change consumer behaviour could in fact cause major losses to Canadian firms.

There are also vulnerabilities associated with the increasing urbanization of the Canadian population, particularly given its implications for food storage space and food preparation skills. The overall accessibility of nutritious food depends not only on the physical integrity of the food supply chain, but also on the ability of individuals to store fresh food and prepare it safely. The perceived quality of Canadian food has implications for other sectors of the economy as well. Britain experienced the negative effects of this interdependency in 2001, when its rural tourism industry – which is closely linked to agriculture – lost an estimated £100 million a week in the immediate aftermath of the foot-and-mouth outbreak (Mosely, 2001).<sup>9</sup>

According to Renn (2008), low-probability/high-consequence events are uncertain risks. For these risks there are insufficient data to make anything beyond a fuzzy estimate of the probability that the risk will occur. For uncertain risks, causal agents are identifiable but their manifestation is rare and unpredictable. Absorbing these risks requires enhancing a system's capacity for resilience, which in turn means reducing its catastrophic potential (even in the absence of concrete threats), introducing flexibility and improving emergency management procedures (Renn, 2008: 46). It is important that risk assessments include input from a wide range of experts and stakeholders, and that decisions about the level of acceptable risk emerge from open and reflective discussion and, where possible, consensus among participants. As Renn notes, this can take different forms: "round tables, open space forums, negotiated rule-making exercises, mediation or mixed advisory committees including scientists and stakeholders" (2008: 52). Although these types of forums are prevalent on issues related to food safety, they appear to be less common with respect to low-probability/high-consequence risks.

In closing, it is worth underscoring that there are no easy solutions to the vulnerabilities and regulatory challenges we have highlighted in this paper. It is hoped, however, that the recommendations in the Executive Summary provide a starting point for identifying opportunities for improving the regime's capacity to address the various risks to the Canadian food supply chain. A key lesson is the importance of acknowledging the contextual pressures operating on the regime, and the way in which they influence certain behaviours among industry, regulators and the public. In light of continuing globalization and the ever-growing primacy of market principles for organizing the production and distribution of food, it is important that Canadian governments continue to work towards facilitating a transparent and accountable regime underpinned by liberal democratic values that serves the broader public interest.

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<sup>9</sup> The UK tourism industry contributes more to both national income and employment than agricultural production and manufacturing (United Kingdom. Department for Business, Innovation and Skills, 2012). It is likely more difficult, however, for government to compensate the tourism industry than the agriculture industry given the challenge of determining how many foreign visitors chose not to visit compared to the relatively straightforward transaction of paying farmers to destroy infected livestock.

## 6.2. Future Research

The results of our research underscore several areas where further research is warranted. These areas are identified below. They represent both potential vulnerabilities and opportunities for the sector, and are absent or rarely considered in the academic literature on risks to the Canadian food supply chain. Many of these questions are also present in related studies we have conducted on the regulatory regimes for transportation and chemicals (Quigley and Bisset, 2014; Quigley and Mills, 2014), respectively, highlighting the potential for a broader analysis that surveys contextual factors common to all Canadian CI sectors.

- How is the supply chain addressing cyber-security? Despite being a prominent theme in other critical infrastructure sectors, cyber-security was rarely mentioned by our interview participants and is infrequently discussed in the academic literature on this topic.
- From an emergency management perspective, what are the specific risks to the Canadian food supply chain posed by climate change? How can Canada learn from other jurisdictions such as Australia where natural disasters have caused major disruptions to the food supply chain?
- Given the competitiveness and ‘just in time’ imperatives of food supply logistics, should government encourage industry to build additional redundancies into the supply chain? For example, should governments stockpile food for distribution during emergencies in the same way that it currently stockpiles pharmaceutical products? What is the appropriate balance between food chain resilience and centralization within the food supply chain and increasing urbanization?
- What are the vulnerabilities to the Canadian food supply chain posed by increasing automation and a growing reliance by some commodity sectors on foreign labour? Beyond interdependencies between Canadian CI sectors, what is the nature of Canada’s international interdependencies in terms of labour, energy, technology and other agricultural inputs?
- Given increased globalization and market pressures, which potentially undermine the mechanisms available to domestic governments to intervene in the market, which new mechanisms are emerging that governments might use to exert control or influence over the regulatory regime?
- How does the regime react to failures that lead to food supply emergencies? What emergency management strategies are best suited to responding to and controlling emergencies in the food supply chain? The Hood *et al.* framework explains the status quo of the regime; it is less helpful in identifying how contextual pressures – the market, public opinion and interest groups – behave following disruptive events. Although this paper considers this issue briefly, a more thorough analysis would lend deeper theoretical rigour to the literature on how organizations react to failures.

## Appendix A: Interview Participants

Table 3 provides sector and occupational information about the individuals we interviewed for this research.

**Table 3: Interview participants by sector and occupational area**

<b>Code</b>	<b>Occupational Area</b>	<b>Sector</b>	<b>Location</b>	<b>Date</b>
FI 1	Communications	Grocery	Canada	June 2011
FI 2	Supply Chain	Grocery	Canada	July 2011
FI 3	Supply Chain	Grocery	Canada	July 2011
FI 4	Senior Corporate Executive	Grocery	Australia	February 2012
FI 5	Senior Corporate Executive	Producers	UK	November 2012
FI 6	Senior Corporate Executive	Producers	Canada	July 2011
FI 7	Senior Corporate Executive	Producers	Canada	August 2011
FI 8	Policy	Regulator	Australia	January 2012
FI 9	Communications	Non-profit	Canada	July 2011
FI 10	Senior Corporate Executive	Non-profit	Canada	July 2011
FI 11	Traceability	Regulator	Canada	July 2014
FI 12	Research	Academia	Canada	October 2014
FI 13	Policy	Regulator	Canada	December 2014

## Appendix B: Methodology

In 2011 and 2012 we conducted semi-structured interviews with 55 CI regulators, owners and operators. Ten of these individuals had professional responsibilities related to the food supply. In 2013, under the agreement of support from the Kanishka Project, we conducted an additional 13 semi-structured interviews. We committed to the Ethics Board and to our interview subjects that we would not use direct quotations from our transcripts without the explicit consent of our interview subjects. During this period we conducted a comprehensive review of the academic literature related to the regulation of the Canadian food supply chain.

A mixed method analysis was conducted on the interview data, employing both quantitative and qualitative methods. The quantitative analysis consists of descriptive statistics, including simple means and response percentages. The small sample size of interview subjects would preclude the use of any rigorous statistical analysis to support generalizations of the findings. At the same time, we have found it useful when conducting semi-structured interviews to ask interview subjects to score contextual pressures that influence how they spend their time, for example. While not generalizable, the scoring allows interview subjects to distinguish more succinctly the impact of the different pressures. It also allows us to rank and compare how individuals perceived the different pressures. We present the data as indicative of the relative importance of the contextual influences as assessed by these individual interview subjects and use it as a departure for analysis and discussion.

We used a grounded theory-based approach to extract and organize additional themes. We supplemented this work with a comprehensive literature review of academic literature related to the regulation of food supply risks. Finally, we used the Hood *et al.* framework as a lens for understanding and analyzing the regulatory regime in place to control risk in the food supply chain.

For the media analysis presented in Section 5.2, we reviewed 1857 newspaper articles from four different newspapers; 1199 were about H1N1 in particular, which were removed from our analysis here. We accessed the coverage of these events by using the Factiva database to search a leading national newspaper in each country: the *Australian*, the *Globe and Mail*, the *Daily Telegraph* and the *New York Times*. These are all high-distribution newspapers and opinion leaders in each of the respective countries. We identified our sample by drawing on all articles that appeared during the year following the date each event began and that included the term(s) most commonly used to refer to the event. We eliminated any articles that were clearly not principally about the event. These types of events tend to appear in large numbers of articles during the year in which they occurred, but the references to the events are often ‘asides’ in articles that are principally about something else.

To analyze the content of the articles, we counted the number of articles that referred to various key terms. The key search terms were selected based on conventional items that were relevant to public administration and risk management. We also determined whether

key actors – such as government and owners and operators in critical sectors – were assessed positively, negatively or neutrally. (N/A was also an option.) To summarize the performance data, a value of + 1 was assigned to each article that was on balance a positive assessment for each key sector and a value of -1 to each article that was on balance a negative assessment (neutral assessments were given 0.) We then calculated the total net sum, adding the number of positive and negative assessments together. When assessing government performance, each order of government was assessed separately. In other words, if one article has a negative assessment of both the federal and provincial government, then it was assessed -2.

All non-H1N1 articles were analyzed during February and March 2010. We reduced the impact of the bias in assessments by using several strategies. As noted, we assessed all the articles during a short and fixed period of time. We also developed a standard template and applied it to all articles. All results were stored in a Microsoft Access database that we developed and maintain. One research assistant classified all non-H1N1 articles in the *Australian*; one classified all non-H1N1 articles in the *G&M*; one classified all non-H1N1 articles in the *Daily Telegraph*; and one classified the *NYT*. The group also met at the start and periodically to review articles together to introduce some level of consistency. Finally, a second research assistant independently double-coded 10% of the articles, as noted below.

To test the inter-rater reliability of all aspects of coding, 10% (n=186) of the 1857 articles were double-coded independently of the original coders. Using Cohen's kappa coefficient we found an inter-rater reliability agreement of  $k = .66$  for government performance assessment. This corresponds to a substantial level of agreement.

## **Appendix C: Notes About the Authors**

Kevin Quigley is an Associate Professor and Director of the School of Public Administration at Dalhousie University. He is also the Principal Investigator to the CIP Initiative at Dalhousie (<http://cip.management.dal.ca>).

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