Food calamities and governance

an inventory of approaches

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Food calamities and governance - an inventory of approaches

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1. Introduction

The concept of governance refers to the *arrangements* made for the exchange of goods and services. They can be between two parties but also involve the whole set of links in a supply chain. They can relate to contracts but also to mutual understandings, quality definitions and agreed procedures upon which contracts are based. While these arrangements can be between private parties, the government is typically involved in providing the institutional setting in which the arrangements are made and can be legally enforced.

Governance guides the trade in food products along the supply chains, from input provision to the farmers, from farmer to processor and consumer. Numerous deals are made every day, institutions such as futures markets and auctions, guide the pricing of products, elaborate arrangements as to sharing of risks are well developed in the intensive livestock sector and elsewhere. The arrangements that have evolved over time, are, in general, typically bottom-up institutions that emerged because they serve the purpose of reducing transaction costs. The institutions help to facilitate the trade in inputs and outputs, and thereby reduce the costs of doing business, to the shared benefit of producers and consumers.
Such arrangements are least needed when products are homogeneous, and individuals involved behave predictably. The more products can differ, and the more the actors involved differ, and the more this occurs in unpredictable ways, the stronger is the need for arrangements, for protocols to cling to when striking a deal. Arrangements must be in place for not adhering to quality standards, delivery times etc. Punishments, legally enforceable or coming from a threat of discontinuing partnership, form part and parcel of arrangements in trade.
While governance is therefore intrinsically geared to dealing with deviations from the standard *modus operandi*, it is, at the same time, limited to the normal deviations. Repercussions of exceptional events are mostly left open and acted upon in an *ad hoc* manner, rather than by the book. In such events, trust and mutual understanding between partners is more important, and indeed put to the test.

In normal circumstances therefore, a governance structure of the food system has evolved that serves the system so as to reduce transaction costs. While its overarching conditions are often set by the government policy as to the sector, the private sector, with the help of an enabling government, has developed arrangements to its own liking.

The question addressed in this review is whether this governance structure of the food system is robust enough to cover extreme events, calamities, that strike unexpectedly and may harm large sections of the system. Do normal arrangements cover part of what should be done in these circumstances, or do they perhaps hinder the application of adequate governance fit for such extreme events?

2. The regulation of present system

The present regulatory system of food production and food provision is a result of changes that developed over time. In a recent paper Lee and Marsden (2009) distinguish four phases in recent history. The first phase they associate with government taking the lead in controlling food and safety standards with ample powers for punishment; in the second phase (estimated to be in the early nineties for the UK), most of the quality control is relegated to the private sector, in particular the large-scale companies; in the third phase the government reappears at the scene, but then at a higher (here European) level, where the Food Safety Agency 'seeks to assert its authority on the basis of risk-management structures'(p.133). In this phase, institutions are set up to monitor risks, but in such a way as to facilitate free trade and enable the establishment of private sector standards. The fourth phase they see starting about now, with more emphasis on food security and indeed the *resilience* of the food system. The latter issues emerge, they say, as a result of increased concentration of the food industry and are therefore based on the same anxiety among the public as the stronger demand for food safety that characterized the third phase.
The interpretation of past events by Lee and Marsden (2009) seems to reflect a growing distrust among the wider public vis-à-vis the large scale enterprises in the food system. After initially bestowing these companies with responsibilities, these were tentatively taken back by the governments after the BSE and dioxin crises and new arrangements must now be made to re-establish the shared responsibility between the state and the private sector.

The occurrence of crises and food scares, and the stronger demand for quality aspects of food has, somewhat ironically, provided a further incentive for firms in the food chain to intensify their collaboration and indeed to merge into larger vertically integrated units. This enables the companies to take full control of quality assurance (Kenneth *et al.,* 1998). As Fritz and Schiefer (2008) argue however, such integration may not go along well with innovation and the flexibility to achieve this. For such innovative process, looser ties are helpful, but loose ties are feasible only, if sufficient transparency of the processes of the firms is guaranteed.
Another disadvantage of the larger size of the companies is that their sheer weight in the food system makes them 'unavoidable' for any regulation that the government may wish to impose. That is, the regulation should be consistent with their way of operating, or it would fail to provide the sought-after guarantee to the public. The very large companies have acquired the status of 'system companies' (using a word from the current banking crisis) whose continued operation is a necessary condition for the system to function. If these companies would fall, substantial harm is done before the system can re-establish itself on a new track.

Resilience of the food system is enhanced (Pingali *et al.*, 2005*)* by strengthening diversity, local institutions and traditional support networks, the use of local knowledge and the individual ability to adapt and reorganize. The presence of 'system companies' in the food system, unless they internalize such requirements, may not be consistent with these demands for a healthy food system.

Taking this point a bit further, a healthy food system should not just guard against 'system companies' but also against occurrence of the same ingredient in too many products or the same port or other 'points of constriction' being used for too large a

share of flows in the food system. The degree of sophistication of the food industries and its globalization has reached a level in which small quantities of many ingredients appear in lots of processed food around the world. Some ingredients, such as glycerin, milk powder or stabilizers, may come from a single source (country) and, as the case of melamine in China showed, impurities overlooked in one country may affect a very large number of food products. Some ports are of exceptional importance for food system, or for parts of it. Rotterdam and Antwerp ports of course play a crucial role for western Europe, and as shown in the British report on its food system some ports take on a strategically important role for specific types of food (DEFRA, 2006).

Good governance of the food system recognizing the strategic role of such companies, infrastructure and limits to the spread of ingredients, would require the authorities to sit around the table with the companies concerned as regulation must be consistent with the practice. While port authorities will be mostly public, many private firms have also reached strategic importance and some public-private arrangement must be worked out to reach sufficient compliance.

Resilience can be seen as an alternative to disaster preparedness (Pingali *et al.*, 2005). The more resilient a system is, the less should one fear disasters. As set out above, however, the system may not be able to withstand calamities, however resilient it was judged to be in normal conditions.

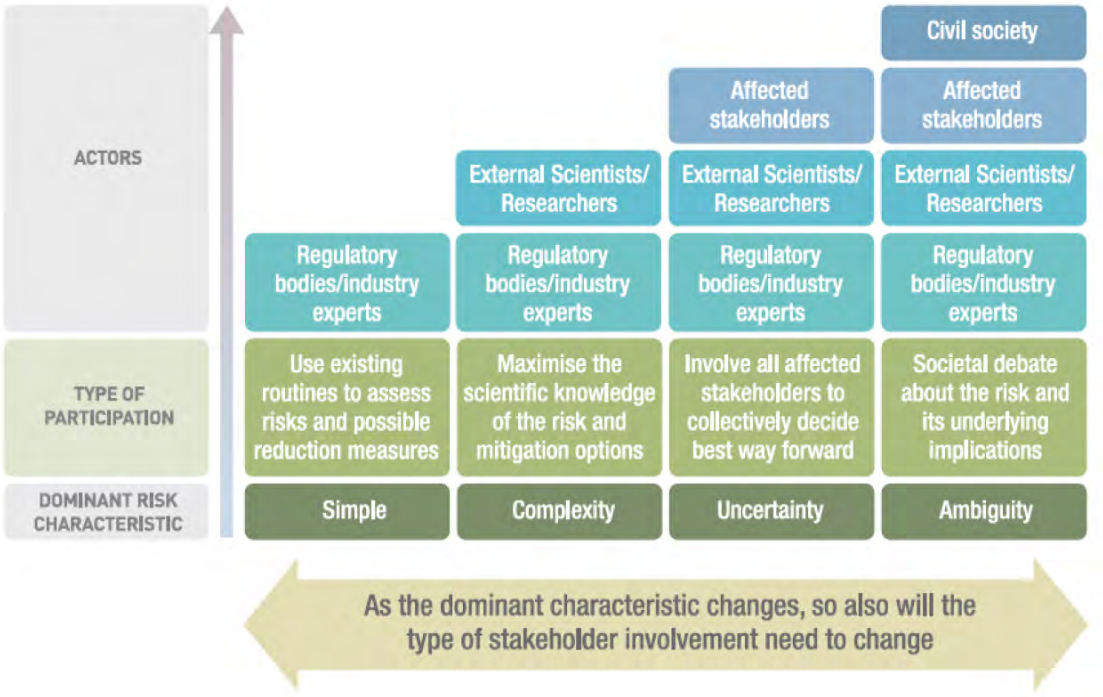
To sustain future events without great harm, the government and stakeholders face two types of task: assure the resilience of the system under more or less normal conditions, and prepare for calamities that go beyond the coping capacities of the system. The less the system can cope with, the more disaster preparation must be made.

3. Governance and disaster management

According to International Risk Governance Council (IRGC, 2008) five linked phases in the risk governance framework are distinguished:

1. **pre-assessment**, which refers to the framing of the risk: is it new, can it be compared to existing risks? Who are the stakeholders?
2. **appraisal**: develops and synthesizes the knowledge base relevant for the risk, its characteristics, probability, stakeholder concerns
3. **characterization and evaluation**: provide the evidence and values upon which a judgment is based as to the severity of the risk, and the need for measures
4. **management** involves the design and implementation of the actions, allocates and verifies responsibilities and assesses repercussions of the actions
5. **communication** is of utmost importance as this is crucial for the creation of trust in risk management.

These phases in the process of risk governance can be considered at firm level, sector level or higher levels. It is a list of steps in preparation for the eventuality of a disaster of some form which, in this context, has to be specified. Yet, the approach differs according to the risk involved.



This figure, taken from IRGC (2008, p18) indicates how the approach differs for different types of risk. Simple risks have simple approaches, uncertain and ambiguous risks require much more stakeholder involvement and encompassing decision procedures.

Applying this to the food system, there are clear similarities. For many decades the food sector had institutional arrangements for the assessment of health risks, using approaches in the ‘simple’ and the ‘complex’ columns. To deal with risks that are not

as objectively assessable, community based, political approaches are followed. Examples include the ‘political’ decision making on trade restrictions in the case of BSE in the UK, and the EU stance on GMOs. Risks that depend on stakeholders’ attitudes and actions, as is the case with large-scale industries, cannot be dealt with without them and must involve these companies and/or their representative organizations. Credibility of any arrangements with the wider public may necessitate their involvement as well.

4. The role of the government

The government has an enabling role in providing the institutional setting for whatever arrangements are made between stakeholders. This may be the regulatory framework, within which companies can assure their customers – and bind themselves legally – that they will adhere to the agreed standards and procedures.

The government has an additional role in solving what is called *coordination failures*. In this role, the government brings parties together that otherwise would not have sufficient incentive to do so. In the case of (food) risks, the development of joint standards and procedures by the industry is an example of collective action that may require a government as a catalyst or coordinator. Standards and safety measures along the supply chains also require coordination, that may or may not be adequately dealt with by the stakeholders themselves.

The government has a role in providing public goods (Paarlberg, 2002), such as security, that requires the government to *force* companies to adopt procedures and apply standards. In this case, it is the government itself that sets the standards (though this is likely to be in unison with the industry concerned). The food security regulation in place in the USA as developed after 9/11 is a good example. This role is also played in providing an economic order that meets the political requirements. Competition laws and regulations aim at limiting companies from pursuing their private goals if this would go at the expense of consumers. In the same spirit, the government may establish regulation to secure that companies that become excessively influential as to standards, or flows and nature of food products, comply with outside monitoring or control, or else scale down.

Finally, the government has a role in developing the framework for the society to face the challenges of disaster risk reduction and enter into discussions on these risks and how these are covered in the present food system and its institutional environment.

To this end, the Hyogo framework for action stipulates that the governments secure:

- political commitment
- legal and regulatory framework
- institutional framework
- multi-stakeholder participation
- capacities for disaster reduction
- financial resources

This **Hyogo Framework for Action** was adopted in 2005 at a conference in Kobe, Hyogo district, Japan and signed by 145 countries as an outcome of the International Strategy for Disaster Reduction (ISDR) by the United Nations. It distinguishes five priorities:

1. Making disaster risk reduction a priority.
2. Improving risk information and early warning.
3. Building a culture of safety and resilience.
4. Reducing the risks in key sectors.
5. Strengthening preparedness for response

As part of the framework, countries adopted National Platforms, that are occasionally based in civil society groups, but often linked to the government. Germany, France, Italy and the UK are among the countries that set up such National Platforms in Europe. The Netherlands appears not to have such platform.

Some aspects stressed above reappear among the five priorities: next to the political commitment, resilience features in priority 3, and the key sectors (including 'system companies') in priority 4. The instrument of Platforms, and the governmental responsibility for multi-stakeholder participation show the emphasis on the interactive approach to the issue. Whilst individual companies may internally adhere to rules that limit their exposures to risks, they may be unaware of what their suppliers, competitors and clients do, and how their economic and social context prepares. Individual activities to mitigate risks are ineffective if they are not attuned to their economic and social environment. To do so requires involvement of all stakeholders and transparency of individually adopted procedures. Only the government can enforce such a process.

While OECD governments are certainly able to play this role, the adoption of the Hyogo framework is not universal in this group. There is a diversity of approaches, with the USA focusing more than other countries on security against terrorist attacks and – in the food sector – bio-terrorism. Outside the OECD, governments may not all be strong enough and countries may not be resourceful enough to adopt an approach involving all stakeholders. The poorer the country, the less scope there is for successful implementation of risk reduction measures.

5. The role of the private sector

The emphasis on the government's role in bringing the various parties of the private sector, civil society and NGOs together is a token of the private sector's apparent inability to do so by themselves. Yet, many companies have made efforts in this direction, also including entering into public debates with the non-commercial stakeholders. The largest companies are often at the forefront of this development, thus showing a sense of responsibility befitting their size.

There are two lines of reasoning pertinent to risk management in the private sector. One is the concept of Business Continuity Management (BCM), which focuses on measures to make companies continue their operations, being more resilient even in times of trouble. The second is the capacity of companies to secure their processes against intrusion. This is an issue that dominates in the USA. The implementation of new procedures has led to adoption of more uniform processes, so as to better and more securely monitor these. This has brought cost savings too.

Helen Peck (2005) has evaluated the resilience aspect for the sectors in the UK. She concludes that Business Continuity Management was still in its early stages of implementation. Few of the companies had moved beyond reactive crisis management to proactive or preventive BCM. The report includes the results of a survey among the business of their actions in relation to potential disasters such as fuel shortages, pandemic diseases, etc. The lack of spare capacity is seen as a problem by the author: the very efficiency of the sector makes it vulnerable. And she concludes that "for the moment it is unrealistic to assume that BCM would ensure the continuity of food and drinks supplies in the event of a national emergency". More government planning to that effect is proposed.

In a related report (DEFRA, 2006) on food security the Food Chain Analysis Group warns against national self-sufficiency, and puts this in a wider EU setting. The flexibility of the supply chains, as evidenced by recent experiences, was praised and as modern risks are heterogeneous and uncertain, strengthening this flexibility is the way forward. This reflects the point of view of the link between innovation and flexibility mentioned above in section 1 and ascribed to Fritz & Schiefer (2008).

Studies on the adjustments in the USA indicate that the implementation of business continuity and security plans in the industry also led to considerable cost reduction because of the simplifications and standardizations that resulted from the effort to make the process less vulnerable. The literature on the US grain industry (Kenneth et al., Wilson et al.) suggests that the increase in processing of food makes the food system more industrialized and hence more demanding in terms of specific qualities that are required to optimize the process. Such optimization may lead to vertical integration in the supply chain to secure the supply of the required quality. This then detracts from the scale economies that were realized before at a horizontal level.

The private sector prepares itself for disruptions in the spirit of what Peck calls 'enlightened commercial self-interest'. Large retailers often have to deal with disruptions here and there, but are sufficiently diversified to deal with it. Food processors often are less diversified, and this also held for some UK port facilities that appear to specialize. The UK firms in Peck's analysis appear to have given at least

some thought to disruptions caused by fuel shortage, electricity shortage, manpower shortage and the like.

A particular private sector role is for the insurance sector. Over time, many new insurance instruments have been developed that offer some form of insurance for the financial damage of disasters, including bonds and options tied to catastrophic risks (Courbage, 2001; World Economic Forum, 2008: p. 32). Successful approaches are insurances for financial damage from earthquakes, as in Turkey or Taiwan (Smolka, 2005). They appear to require a compulsory premium payment however. Other possibilities are the insurance of costs related to food aid or insurance of states for the immediate costs after a disaster (Ghesquiere and Mahul, 2007).
While in principle insurance premiums can act as incentives to mitigate risks, this requires the premiums to be conditional on the measures taken. Often this goes beyond the capacity of the insurers regarding enforceability and a reliable calculation of actuarially fair premiums. In addition, while immediate individual financial risks could be covered, the damage itself is not, nor its effects on third parties, future developments etc.

6. The role of research

The implementation of disaster risk reduction requires more knowledge about the possible effects of disasters, their values and their probabilities. It also requires novel research on the social aspects of the stakeholder participation in the process, and the psychological factors that come with assessment of extreme events with low probabilities but large damage. The International Council for Science (ICSU, 2008) has formulated a science plan for integrated research on disaster risk. It includes research to characterize hazards, to understand decision-making in the complex and changing risk contexts and to reduce the risk and curb losses and vulnerability.

Within the context of IPCC, of course, a tremendous amount of research in disasters related to climatic events is assembled. Of relevance for the governance of disasters will be the recent proposal to launch an IPCC review on managing risks of disasters. O'Brien *et al.* (2008) whose report led to the initiative, review the research on disasters and human security to conclude that the social dimensions of disasters are often overlooked, in the sense that humanitarian assistance focuses on restoring the normal conditions, without addressing the issue that these 'normal' conditions meant that households were vulnerable to the disaster in the first place. Resilience of the country's economic, social and food system is therefore key to reducing disaster risks.

7. Current national arrangements concerning food provision

Many countries have taken measures and elaborated plans to prepare their citizens for disasters. Most common disasters that are envisaged are earthquakes, flooding and droughts, to which 9/11 added terrorist attacks. The OECD (2003) distinguishes five *systematic* risks: natural disasters, industrial accidents, infectious diseases, terrorism and food safety. The World Economic Forum (2008) gives no less than four domains with 31 distinguished risks: 6 risks in economics (including volatile food prices in the food system); 12 risks in geo-politics (including more trade barriers); 7 risks as to environment (including droughts, flooding); 4 risk in society (including infectious diseases); and 2 in technology including disruption of critical information infrastructure. It is noteworthy that most of the risks pertaining to the food sector in this January 2008 list were not included in 2007 list of the same Forum.
For all such risks, countries have prepared themselves in one way or the other.

Countries facing regular **droughts** (e.g. Australia) have developed schemes to deal with drought as they strike, but have also moved from such coping regulation to more management oriented measures. These imply that farmers and other stakeholders are made more aware of what they can do to diminish the probability or severity of such droughts. Wright (2005) describes how drought changed from a 'natural phenomenon' before 1990 to an issue for which individual farmers could prepared themselves, with only access to government assistance in severe emergency cases. In addition, more support arose for actions to stimulate preventive actions, issuance of 'water rights' in rural areas, and water cuts in urban areas. Special actions are needed for young farmers, old farmers, non-farm rural businesses. Better forecasting approaches should be possible. It is a line of policy that is also advised by Wilhite (2005) for other regions, including the EU. Apart from Australia, and South Africa, and to some extent USA, countries have no drought plans, he asserts. Motha (2005) describes how the USA has made the same transition as Australia in moving from a reactive behaviour (providing assistance *post hoc*) to a more proactive approach. The latter approach is more bottom-up as it requires the involvement of the local communities so as to be alert on first signs of damage, and oversee the use of good practices. Taking this proactive approach, evaluating the size of the risks that lie ahead, and pooling these risks offers opportunities for risk coverage through commercial (perhaps partly subsidized) insurance policies.

Countries facing risk of **flooding**, such as the Netherlands, have prepared by providing protection that reduces the probability of flooding. The traditional norm maintained by the Netherlands as to the probability of flooding was 1 in 10,000 years for the sea dikes. The recent Deltacommissie (2008) proposed however to reduce this probability by a factor 10 in view of the uncertainties surrounding future rise in water levels, and the updated (much higher) estimates of the damage that flooding would cause. Responsibility for the proposed measures falls, however, almost exclusively on the government, though regulation is in place requiring farmers to maintain unobstructed waterways etc. To cope with calamities such as flooding, an institutional setting is established that also provides training and realistic exercises to test the preparedness (Ministerie LNV, 2008). Crucial element proved to be the communication among the many stakeholders and decision making levels involved.
In Europe, as Vetere Arellano(2007) shows, many institutional arrangements are in place to deal with inland flood risks in and around river basins. The authors sketch the

same shift of approach as for droughts: from reactive to proactive, with the underlying implication that floods are no longer seen as natural hazards (acts of God) but rather the result of failing, or at least insufficient management. The proactive approach can only be successful if the stakeholders are (made) sufficiently aware of the consequences of their behaviour and the links between policy measures and behaviour. Communication, as so often, is key.

As to **food risks**, developed countries have focused on food safety and food security, in the American sense of the word, which refers to safeguards against bioterrorism. A good example of the measures considered is given in the recent reports made for the UK and referred to above under 'the role of the private sector'. The reports, and the UK cabinet's view is to see the food provision in a international context, with an emphasis on Europe. Self-sufficiency is not an attractive option, they assert. Much of the actual monitoring is left to the private sector, which is required to follow the HACCP protocol. Government's role is to see to it that they do, and take action if they do not. The private sector has occasionally set even higher standards for suppliers in the chain than the official standards. Yet, the survey among the private sector in the UK found that insufficient spare capacity is maintained and that the system would not be able to withstand a major shock.

In the USA, even more emphasis appears to be put on abiding by strict rules as to monitoring of goods, flows and the people that can possibly interfere with these goods. Again, the governance aspect of it is that the government sets the regulations, checks, and corrects where needed, but the companies determine the actual arrangements made in accordance with their exposure, environment etc. Examples are in USDA (2005a,b).

There appears to be no use of **strategic stocks** in countries such as the UK or the EU, while the USA abolished the reserve in 1996. A specific supply strategy is developed in Switzerland, where the Swiss Federal Department of Economic Affairs has a National Economic Supply Strategy, that includes compulsory stocking of essential food items for a consumption of 6 months, as well as energy and pharmaceutical items. Plans are developed in close collaboration with the industry. Among the developing countries, India maintains a large national grain reserve as a result of its interventions in the market.

8 Initiatives by the European Union

The European Union was already mentioned above as a locus for policy initiatives as to flood risks. It deploys also activities in other fields of risk. This ranges from standards for risk assessment in companies, to regulation of risk taking by financial firms, and the regulations as to health risks by the European Food Safety Organization EFSO.

As to uncertainties about the quality of food, EFSO published Euro-barometer (2003) findings that show that no single source of food risks is dominant. Most mentioned answer to the question of "what comes to mind when thinking about problems or risks associated with food" is food poisoning (16% of respondents), followed by toxic substances in food (14%) and overweight (13%). GMOs score 8%, food additives 7%.

It is noteworthy that the fear for some adulteration or interference with the food outside the household features prominently. This supports the call for emphasis on the reliability of the food system to secure healthy food.

As to the wider issue of disaster prevention, on 23 February 2009, the European Commission (EC) put forward two Communications related to disasters: On the prevention of natural and man-made disasters within the EU**;** and an EU Strategy for supporting disaster risk reduction (DRR) in developing countries. The first communication is rather tacit on any measures, and strives mostly toward integration and coordination of national measures, something which is also aimed at by the meetings of the Hyogo National Platforms where these exist. The second communication relates the EU assistance for developing countries to the same Hyogo framework and aims at contributing to disaster risk reduction in the supported countries.

Boin *et al.* (2006) investigate the capacities of the EU to actually deploy useful activities in relation to disasters. Their work looks at the roles that the EU functionaries can play in four phases around crises: prevention, preparation, coping and aftermath. Their conclusion is the EU capabilities at the various directorates coincide with their experiences and involvements with earlier crises. In general there is alertness and possibility for quick decision making. Planning seems to be foot-loose in that it does hardly involve the member states, while coping activities are difficult again due to the interaction with the members states involved. The willingness to learn was there.

The research shows that finding the appropriate level of response to a crisis is an art by itself. While all events must naturally be dealt with at the lowest level, higher levels had better not interfere as long as lower levels can cope.

9. International arrangements

The same adage applies to international arrangements. There are economies of scale in the prevention stage, an area where the EU also scored well in Boin's *et al.* research. Such economies of scale are exploited by organizations as the FAO, with a global coverage of food trade and food risks. Their GIEWS division on Global Information and Early Warning System monitors food production globally, which for an integrated world is useful. FAO also houses, where needed, crisis management centres, as for example established for the avian influenza. It is, in this sense, providing part of the institutional framework that is required to deal with international crisis situations. This does not extend to legal and regulatory work, as this is up to the member countries. Its expertise is helpful for preventing crises, and advising on coping with crises when these emerge, and surely for the evaluation and accumulation of expertise.

As to grain trade, the FAO together with the International Grains Council, serves the International Grains Agreement, which helps to keep up transparency in case of food aid and grain shipments. For a crucial food (and feed) ingredient like grains, close monitoring of shipments, stocks and prices is welcome, and that is what IGC and the FAO do. As food aid may interfere with grains trade, this is also made more transparent by the Food Aid Convention, also served by the IGC. The latter convention also regulates that the major exporting regions make some amounts of grain or cash available for food aid when so demanded. The Food aid Convention is under discussion (Hoddinott and Cohen, 2007) as to its goals and representation. The present goal is not much beyond some pledges for grains or cash, and it might be opportune to extend this to wider ranges of goods, a wider food security objective and better representation in the council. The Grains Agreement had already been extended to cover not just grains but also rice and oilseeds.

While there are international arrangements for trade policies, and protocols and constraints regarding their changes, the recent financial crisis shows a lack of internationally agreed supervision on risks taken by individual companies. As the World Economic Forum (2008) writes 'Extended supply chains, which have allowed global economic integration to flourish in the last two decades, may be concealing increased vulnerability of the global system to disruptive risks' and it concludes to 'a need for governance of globalization' (p.6).

10. Conclusions and recommendations

This review of the governance regarding food calamities indicates that a shift is being made from a reactive approach to calamities to a proactive approach. The reactive approach is to come into operation when the calamity has occurred and naturally therefore, the governance of it relates to an effective way of providing the required assistance, with possible extensions towards later reconstruction, and lessons learned for the next time. The proactive approach sees calamities as intrinsically unavoidable, but with good possibilities for mitigation. Starting from the expectation that calamities will occur, the stakeholders can prepare themselves for it, perhaps assess its probability, and possible damage. This gives scope for *ex ante* measures aiming at improving the resilience of the (food) system, and preparing stakeholders on what to do in case the calamity occurs. For some disasters, it becomes possible to insure the finance that is expected to be needed when calamity strikes.

Risks envisaged in the food chain require governance with respect to the chain's resilience and regarding preparation for coping. Resilience of the system in Europe is considerable, but a renewed balance must be found between responsibilities of government and the major trading, processing and servicing companies in the field. Much of the governance in the EU is done in a European setting, following EU guidelines as to transparency, risk monitoring etc. This is the adequate level for building on resilience. Trust in food products and securing reliable links in the supply chain is a European if not global responsibility. More analysis should be made of the division of responsibilities between private sector, members states and the European Commission. It would require focus on 'system companies', and important points of constriction (often included under 'strategic infrastructure'), and limiting too wide a spread of specific ingredients. Resilience is helped by diversity, not by scale.

With respect to the primary producers, their exposure to climatic conditions causes highly covariant risks that affect the industry (and rather distantly consumers). In this domain too, a proactive approach is to develop more resilience against drought and floods in the agricultural sector. Only little evidence was found for such proactive activities in Europe.

When it comes to coping strategies, the level at which this is handled is different. The experiences with disasters were much more at the national levels, with national authorities setting the stage, even when acting as executors of EU regulation. The help services and information flows tend to have national channels, rather than EU channels. While preventive measures can be designed at the EU level, coping strategies must be worked out and practiced at the local, national levels.

The international arena recognizes this importance of involving local stakeholders in preparing for disasters. Its Hyogo Framework for Action includes many steps geared toward such involvement and the collection of relevant research output to support decision making. National Platforms are established in many countries to help foster this process. It is surprising that such a Platform does not seem to exist in the Netherlands.

Within the private sector there is some evidence of limited capacity for dealing with shocks, due to limited storage and spare capacity. While understandable, this may

prove costly when calamities strike. Fiscal and other measures can be considered to promote stronger robustness of the food industry.

The European industry might benefit from an overhaul of its operations with a view to business continuity management. The examples of the USA and elsewhere show that further reduction of the potential for disaster can be achieved by harmonizing processes, ingredients and sourcing routes and this is also a cost-effective exercise.

At the international level there should be an institution providing governance of the international transactions in the food chain. The WTO is a forum for establishing rules against trade limiting actions, but its powers do not include regulations for the multi-national companies, or the desirability of limits on transmission of shocks from one region to the other, or standards for transparency and accountability of firms that determine the resilience of the whole food system. A global institution for governance of globalization is needed indeed.

The institutional arrangements and governance of the food system have worked well. But they may not assure sufficient resilience of the very system in the face of further globalization and growth of oligopolistic structures. This would require global governance and corresponding institutions..

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Appendix: Terms of Reference

The terms of reference for this inventory study are

Inventory 3: Long-term strategic governance of the resilience of the world food system

1. Review of literature, in which a distinction is made in
    a. disaster preparedness
    b. disaster coping
    c. disaster avoidance (such as by social cohesion to avoid conflicts, policies to avoid flooding landslides, climate change etc.)
    d. planning under uncertainty as to disasters
2. Review of measures and action already taken, both internationally and nationally; and in particular an overview of risk-management and risk-coping measures with their financial and non-financial costs and benefits
3. Review of private sector measures and actions and elicitation of scope for public-private partnerships

The output is a report on the findings and the views gained in this inventory study, including a strategy on how to elaborate the issue further in a subsequent study with a view to practical policy advice. The main attention will be given to the identification of strategies, which can contribute to avoidance of and coping with potential food calamities.