

TRANSPARENCY IN NETCHAINS

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Abstract:

The paper defines transparency in agri chains and networks and discusses its preconditions, effects and institutional embedding. International aspects receive special attention. Because the food and agribusiness sector have such obvious links to public health, improving transparency in them is particularly important. The international context is imperative because most of the food we buy in our shops crosses national borders during its production.

After pleading that a multidisciplinary approach is needed the paper suggests three levels of transparency: history transparency (e.g. tracking and tracing), operations transparency (e.g. collaborative logistics planning) and strategy transparency (e.g. joint innovation). While the first of these has a defensive connotation, the latter could be logical next steps.

1. Chain and Network Studies

Chain and Network Studies has been posited as a new interdiscipline (Beers et al. 1998, Diederer and Jonkers 2001). For the sake of brevity we shall speak of Netchain Studies in this paper. Its mother disciplines are of three streams: 'β', in casu technology; information systems, and '?' or social sciences, in casu organization studies, economics and law. The interdiscipline is at the cutting edge of β and ?, with information systems as the linking pin. Information Systems itself is in fact an interdiscipline of β and ?. The reason for mentioning it is its special importance to Netchain Studies. The formation of netchains asks for exchange not only of goods and money – which happen in any transaction – but also of information. Information constitutes the lifeblood of the netchain.

History has shown that it takes many years for new technologies to become agents of social and institutional change. The telephone, the car, and the Internet are cases in point. It can be expected that netchains will also take many years to reach their full impact on business and society. Currently there are still many barriers to netchain integration, and the tension between the tendency to hide and the need to provide your company data is central to many of them. Another potential problem is that chain integration can conflict with antitrust law, notably in the USA.

Netchain integration offers huge opportunities for better serving the needs of customers and society. ? sciences can investigate these. They can help, for instance, to understand the behaviour of consumers and other stakeholders; to constrain developments such as market monopolisation; to understand co-operation versus defection; to align practices in different countries; to set the research agenda for the β sciences and analyse the societal impacts of new technologies. Netchain integration offers a new, widened context for technological innovations to be investigated by β sciences. One among many other functions for β sciences is to enable collection of data that occur in one part of a netchain and are needed in other parts.

The formation of netchains also constitutes threats to customers and society: any large-scale system can cause large-scale damage when it breaks down, and large international netchains have in the past caused international food scares and will no doubt do so in the future. Information systems are crucial to contain these risks. ? sciences are crucial to understanding how stakeholders in various parts of the world perceive them and respond to

them, and to help create institutional and legal systems around netchains to enhance their benefits and diminish their risks.

2. What is transparency?

If information constitutes the lifeblood of the netchain transparency enables it to flow. Transparency in production netchains has recently become a buzzword. It builds on the existing notions of tracking and tracing but takes a less technological stance. The term denotes an image of a production network in which information can travel unhindered. Consumers can thus effortlessly find out where their products came from and how they were produced; likewise producers can find out without trouble who bought their products. This is not reality, but it is an ideal to many. Its promise is to enable netchains to respond quickly to market demands and to calamities.

Skeptics may say that transparency is just window-dressing, and that the real issue is 'how to hide the essentials'. It can be a strategic decision not to be transparent. But reality is not just black and white. Studying the effects of hiding or sharing certain types of information is an important aim of the focus area.

One of the appealing aspects of the notion of transparency is that it so clearly takes the netchain, not the individual organization, as its focus. It is a concept that pertains to netchain studies, not only to one of the contributing disciplines shown in Table 2. In the focus area we want to highlight this fact and give the concept an integrative role, stimulating research that bridges discipline boundaries.

If the entire netchain is transparent, who benefits? The concept invites to explore the positions of all the netchain's stakeholders. All actors may have to provide additional data to the others, as well as to stakeholders who are not involved in the flow of products, such as government bodies. What are the costs? Does it entail power shifts? What does it mean for the workload of a farmer? What degree of trust between actors is a precondition? Does transparency call for, or cause, fundamental changes in netchain communication and governance structures? To answer these and related questions, we shall first establish a formal definition and build from there.

2.1. Definition

Transparency of a netchain is the extent to which all the netchain's stakeholders have a shared understanding of, and access to, the product-related information that they request, without loss, noise, delay and distortion.

In this definition,

- *Netchain* (Lazzarini et al. 2001) is a directed network of *actors* who cooperate to bring a *product* to customers;
- A *netchain actor* is an organization, usually a producer, distributor, processor or retailer;
- A *stakeholder* is a netchain actor, or an institutional actor with some stake in the netchain, or a customer;
- A *shared understanding* is a precondition for transparency that involves sharing or seamless translation of language, meaning and standards at many levels:
 - a shared language,
 - shared interpretation of key concepts,
 - shared standards for product quality,
 - shared reference information models,
 - shared technological infrastructure;

- *Product* is a product or service. In this paper the context is limited to the agri-food or pharmaceutical sector – but the definition also holds in other sectors such as health care;
- *Product-related information* is meant in the widest sense and can include e.g. information about raw materials, production processes, labour circumstances, or environmental impacts. It can serve various aims, e.g. preserving identity, food safety, or adding value;
- *Loss* means that an actor does not transmit information. It affects completeness;
- *Noise* means that an actor adds non-relevant data to the information. It affects relevancy. This is a subjective notion. Noise can point to lack of agreement among actors as to what information is relevant;
- *Delay* means that an actor delays information. It affects timeliness;
- *Distortion* means that an actor changes the information either by accident or on purpose, or fails to update it if the product changes, so that the information no longer actually describes the product. It affects validity.

Flow of product-related information through a netchain is also known as tracking and tracing. Tracking is sending information up the chain from customer to producer; tracing is sending information down the chain from producer to customer. The words tracking and tracing very much connote flow of information. In the case of transparency, the information just exists, available to anyone. This agrees with current transparency initiatives where a trusted third party collects information from all netchain actors and keeps it in a repository. At least theoretically, such a repository can be a powerful tool for preventing loss, noise, delay and distortion; and as a result, for enhancing transparency.

2.2. Preconditions

If the netchain's stakeholders did not request information, there would be no reason to make the netchain transparent. Therefore, knowing what information the stakeholders need is a precondition for transparency. This is why the definition specifies *all the netchain's stakeholders* and *the information (...) that they request*.

The stakeholders can only exchange information if they have a shared language. In fact sharing or seamless translation of language, meaning and standards is needed at many levels, as indicated in the definition by the clause *a shared understanding*.

The consumer as a stakeholder is a special case. Individual consumers speak with their feet and purses by buying or not buying. These very same consumers can also play the role of citizens, e.g. when they assemble in NGOs and try to influence public opinion or take institutional action. Retailers tend to anticipate the actions of both consumers and citizens, and the latter force retailers into action around value-related quality attributes such as worker conditions, child labour, use of GMOs, use of pesticides and animal welfare. The type of concerns voiced by citizens, and the types of actions in which they engage, vary strongly across countries.

2.3. Effects

Ideally, transparency makes for responsiveness of the netchain to outside events. It notably enables

- producers to anticipate market demand accurately;
- intermediate netchain actors to plan their capacity accurately;
- quality control actors (e.g. various governments) to quickly take action when defects surface so that the origin is traced and spreading of the problem can be curtailed;
- customers to assess where their purchase comes from and what quality- and value-related attributes it possesses.

In reality, another effect could also occur. The investments in common standards and infrastructure could entail that actors are faced with high transaction costs should they wish to opt out of the netchain. This could lead to loss of flexibility in the market.

3. History

The label ‘transparency’ is historically a logical one. As soon as chains of organizations became a focus of research and business endeavours over ten years ago, it was clear that three flows were involved: products down the chain, money up the chain and information both ways. These three flows have each received due attention over the years. The product flow is central to the field of chain logistics. The money flow is central to the field of e-commerce. Transparency is in a sense the holy grail of chain information propagation.

Over the last years, information flows down the chain have become known as tracking and their reverse as tracing. Tracking enables producers to find out what happens to their products, whereas tracing enables consumers to find out whence their purchase came from. Transparency combines tracking and tracing and takes a more metaphoric stance, looking into the chain from outside. Much of what is known as tracking and tracing is relevant to transparency.

The research domains of supply chains (with a historical focus on technology and logistics) and networks (with a historical focus on institutional aspects) have recently almost merged. An overview of their recent history can be found in Diederer and Jonkers (2001). Rather than use the formulation ‘chains and networks’ we adopt the term netchains in the sense coined by Lazzarini et al (2001).

3.1. Quality of information

The notion of transparency suggests that one can effortlessly look through the netchain from one end to the other. This implies a focus on information, and our definition takes an information point of view. This by no means precludes contributions from other disciplines; on the contrary, information is no more than the raw material on which other disciplines work.

Because transparency is about effortless access to information, quality of information is a pertinent notion. This is an old, venerable topic in the field of Information systems. Bob Zmud (1978) proposed to dissect the concept into a number of dimensions. Basing himself on existing classifications he empirically derived a classification that we have modified for adoption in this project:

Quality of data

1. relevant: applicable, helpful, needed, significant, useful
2. accurate: accurate, believable
3. factual: factual, true
4. quantity: complete, effective, material, sufficient
5. reliable: reliable, valid
6. timely: current, timely

Quality of format

1. arrangement: orderly, precise
2. readability: clear, convenient, readable, simple

Quality of meaning

1. reasonable: logical, sensible

Table 1: Derived dimensions of information (after Zmud, 1978).

The information quality elements in the definition of transparency can all be located in table 1 under the heading 'quality of data':

- ◆ Loss is covered by 4, quantity
- ◆ Noise is covered by 1, relevant
- ◆ Delay is covered by 6, timely
- ◆ Distortion is covered by 2,3 and 5. This is no accident because it is arguably the most important of the four aspects. Misleading information about the composition of food can have very severe consequences, as affairs with consumption oils have shown.

Quality of format is not included in the definition because it is of a more superficial nature than quality of data. Nevertheless it can have great effect on the person who uses the information – for instance, the consumer reading an information label in a shop. It is a legitimate concern for netchain actors who wish to improve their transparency.

Quality of meaning is not included in the definition because it is taken for granted. It presupposes that each netchain actor knows what the other is talking about. This may be a mistaken assumption in some cases, particularly in netchains that cross product/market or national borders.

3.2. *Types of information*

Product-related information, in the context of a netchain, can refer to various types of information from various sources. There will be particularities for each individual netchain. Yet a general-purpose classification can serve as a starting-point for finding information that is to become transparent in a netchain. All these types of information pertain to a smallest homogeneous product unit.

1. Inherent properties of the product. These can be seen or otherwise measured on the product. Most inherent properties can change over time, e.g. taste, content of chemical components, bacteriological status, visual attractiveness. Some are not likely to change, e.g. size
2. Process properties. These constitute the history of what has happened to a unit. If units are combined, for instance on the basis of equal inherent properties, then you get units with non-homogeneous process properties, which may become a problem when tracing product provenance through the netchain, e.g. in the case of a recall.
3. Properties of means of production used on the product. This is in fact an extension of the previous category. It includes machines and labour. In the case of machines, contamination issues can arise. For instance, if a machine is used for non-GM seed after having been used for GM seed, very rigorous cleaning is necessary. In the case of labour, ethical issues can arise, as when customers refuse to buy products because they suspect that children have been used to produce it.
4. Provenance data of the product.

In the case of products that are made up of components, all but the first category have a recurrent element in that they hold for each subproduct in the product decomposition tree.

It is quickly apparent, given this classification, that there is a complex design aspect in providing transparency. Adding the requirement that the netchain be still open to entry of new partners makes this even clearer. Generic information models or architectures that can serve as standards may alleviate this problem.

4. State of the art

The term 'transparency' is very new and so is the field of Chain and Network studies. Searches on the Web and in academic literature carried out in 2002 have yielded very little (see Hofstede 2002b). This has led us to use our own judgement in positing the theme of transparency. To summarise the state of the art of research into transparency we distinguish three perspectives:

- ◆ 'Transparency proper' is concerned with what transparency *is*. This theme concerns research that grounds the notion of transparency in various contributing disciplines.
- ◆ 'Aims of transparency' teaches us what transparency *can do*. It calls for action research that can deliver proof or disproof of practice.
- ◆ 'Context for transparency' is about the institutional, international and other contexts in which transparency becomes embedded. It explores the wider implications of transparency.

4.1. Transparency proper

Transparency has its roots in tracking and tracing, which is known in the literature. A textbook summary and many references can be found in Sandoe and al. (2001).

The article by Lazzarini et al. (2001) that introduces the notion of netchain does not deal with transparency. Yet it is an important point of departure in that it integrates the notions of chain and network in a practical way. If we limited the study of transparency to chains only we would be missing the majority of real-world businesses. If we limited the study to networks we would be missing the process- and information-oriented streams of research that have given rise to the notion of transparency.

In fact we believe that the present article is among the first to explicitly define and develop the concept of transparency in netchains.

4.2. Aims of transparency

Diederer and Jonkers (2001), used by Omta et al (2002) in their editorial, is an important source of information in this field. The domain note specifies a number of driving forces for netchain co-operation. In brief, the rapid advent of new technologies calls for increasing responsiveness of netchains. The huge dynamics of consumer markets in which fashion and the claims of citizen organizations are rapidly spread by the media call for transparency of netchains so that they can substantiate claims about their products. Diederer and Jonkers (2001, p.3) note that 'evolving public awareness requires higher transparency of value chain and networks'. In this sense the word transparency seems to specifically denote 'as seen from the vantage point of the citizen'; but in fact all netchain co-operation calls for transparency internally in the netchain.

Verbeke (2001) reports on recent changes in the Belgian livestock sector. He notes that once the information flows required for traceability are created, new issues of information management are raised and new possibilities occur for using the information pro-actively. Perhaps transparency can do more than just providing the traceability for which it was created.

4.3. Context for transparency

Trienekens and Beulens (2001) show how the recent crises in food supply netchains have induced European governments and retailer chains to impose new demands on their suppliers. They also mention examples of cross-national differences, both within Europe and between Europe and the USA. A relation of customer attitudes with national culture seems plausible.

Opara and Mazaud (2001) place transparency in the context of worldwide ecology and economics. They specifically deal with traceability, meaning the ability for customers and food safety agencies to trace the history of a product. Traceability, they argue, is a new index of food quality and safety. They show the political relevance of this (*ibid.* p 240):

“Globalization is characterized by competition and promotes free trade, which in turn demand global harmony in standards of food quality and safety”.

In practice, the introduction and enforcement of global standards for food production is taking place at high speed but not without problems caused by differences in language and other circumstances. In practice, also, ‘free trade’ seems to be a one-sided concept, according to Oxfam International (2002, discussed in NRC 17 April 2002), particularly so in agriculture. Both the EU and the US protect their own agriculture, with the result of making it harder for other countries to access their markets. It is therefore not far-fetched to suppose that imposing transparency and its attending requirements for conformity to standards invented in developed countries *could* be used for more than just satisfying customer requirements. Research into the political aspects – either detrimental or beneficial - of transparency in an international context, might thus be justified.

5. Unknown territory

The research agenda for transparency, itself a buzzword, is replete with other buzzwords. We shall discuss a few. In search for basic issues that pertain to transparency, two notions shall then be explored: institutional mechanisms and national cultures.

5.1. Buzzwords

Transparency is an appealing concept, but so far it is no more than that. We still need to explore its ramifications for theory and practice. Its precursors, tracking and tracing, are technologically informed notions. They are still being implemented and are not self-evident even in the most high-tech netchains. How they can be implemented in a netchain’s processes and enforced, and what are the attending costs and benefits, is largely conjectural, particularly in international netchains that still face more basic problems. Information informed by practice is therefore urgently needed.

Another buzzword is integrity. This word connotes wholeness, honesty, purity, the unspoilt – but leaves it to the imagination in which sense. It is used as a label for products, suggesting that the product does not pretend to be something it is not. One could argue that the customer needs transparency to be able to find out whether his purchase did indeed possess integrity. A product whose label suggests a way of production that is in sharp contrast with reality would not have integrity.

Buzzwords come and go, while underlying problems are longer lived. Better flows of information and better responsiveness, the aims of transparency, are problems that will not disappear but have to be addressed. In many cases they require research right from basic biochemical disciplines (about e.g. the microbiology of diseases or the chemistry of beneficial elements) to the economic or sociocultural implications of system innovation in food netchains.

Current issues with buzzword status, e.g. ‘genetic modification’, ‘license to produce’, ‘food integrity’ or even ‘food safety’, may well go out of fashion before the underlying problems have been fully addressed. The same holds for quality certificates that are currently proliferating: without adequate knowledge of the processes that affect food properties throughout the netchain these certificates cannot deliver their full promise. It is the aim of this KLICT programme to point, as much as possible, to the more fundamental issues behind the buzzwords. Not all of these will have been solved in December 2003 when this programme ends.

5.2. Institutional mechanisms and transparency

However useful, the concept of transparency pertains to only the information aspect of a netchain. The information flow in a netchain is dependent on the organization of that netchain as a whole. The three archetypal mechanisms for network governance are presented in figure 1.

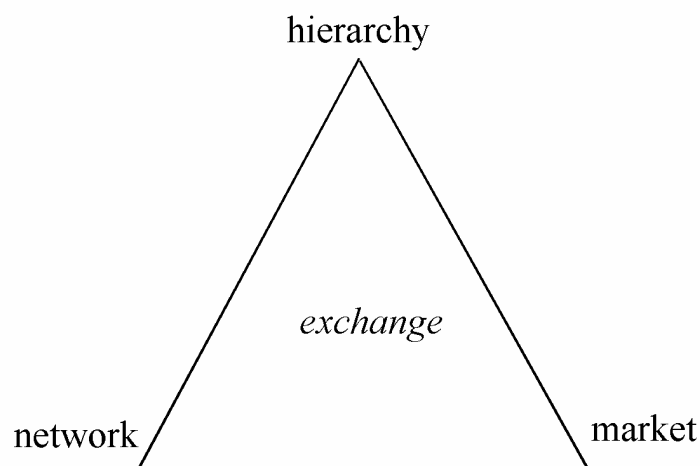


Figure 1: three types of institutional mechanisms (after Powell 1990).

The three network mechanisms have different information exchange patterns associated with them.

In a market, the actors have no obligations to each other apart from exchanging things against an agreed price. Information also has its price, and withholding it can be made to have its price – e.g. by law. Withholding information is detrimental to a market because it inhibits pricing.

In a hierarchy, the boss and inferior, in economic jargon the principal and agent, have asymmetric relationships. The principal has paid the agent to provide some service, but may want to check on him. He then needs to know about the agent’s behaviour, but the agent needs not know about the principal. In netchains, certification is a mechanism for checking whether agents keep their contractual arrangements.

In a network, norms regulate behaviour, not economics alone. Actors will provide one another with goods or information knowing that some time they will receive something in return if they need it. Networks have low transaction costs because no checking is needed. Implicit trust takes the place of certificates. But networks are, as Giddens (1997) would say, a high-trust system. This implies that it takes a lot of investment to create them, though not in

the financial sense. It takes common understanding of the practices in the network, and this in turn may for instance take common education.

In reality, netchains harbour a varied mixture of these exchange mechanisms. The institutional mechanism that prevails in a netchain is likely to affect the type and degree of transparency that is economically efficient. Transparency requirements and institutional mechanism can be expected to influence one another, with the latter having primacy.

5.3. National culture and transparency

The mix of institutional mechanisms that prevails in a netchain, as well as its level of transparency, are likely to be strongly correlated with the cultures of its participants. Where trust and voluntary international co-operation are important, national culture should be taken into account. For cross-national netchains, Geert Hofstede's dimensions (Hofstede, 2001; or the more accessible Hofstede et al. 2002) are a good starting point for positing a number of suppositions. Hofstede senior empirically found five dimensions of culture at the national level. These coincide with five basic social problems: (1) identity, (2) hierarchy, (3) gender roles and aggression, (4) fear of the unknown, and (5) the gratification of needs. How can each of these dimensions be brought to bear upon transparency in netchains?

Individualistic cultures prevail in most wealthy countries, in particular the USA. They hold that every individual is independent. By proxy, they tend to adopt the same model for organizations. Transactions are regulated by contracts or informal deals, but with no commitments ulterior to the particular transaction. They will favour markets as the model for institutional networks and be very suspicious of businesses that co-operate. Cooperation between actors is only obtained if each actor expects to gain something from that cooperation. As customers, people in individualistic countries are expected to have their own unique taste.

On the other side of the continuum, collectivist cultures will favour networks that feel like extended families. They hold that the group is the close-knit unit of social life. Such groups are often led by 'father' or 'mother' figures. Individuals are bound to one another by life-long links of loyalty and obligation, and there is no need for contracts. In fact making contracts almost amounts to saying 'I distrust you'. However, at some point a line is drawn between in-group and out-group. Out-group people are very distant and must, though rituals and over time, be changed into friends before any business can be done with them. In such a cultural environment, business netchains will not have the reconfigurable modular nature attributed to them in Western minds. Providing information about the dealings of one's in-group friends to outsiders is seen as morally wrong – so that lying about this is not problematic. Favouring one's friends over others, often labelled corruption in individualist countries, is perceived as morally right.

Cultures of large power distance will have hierarchical organizations, similar to a military organization. Respect is an important virtue. Delegation of authority is problematic, and this can impede transparency. Providing information that is not controlled by the leader to third parties may not be acceptable. Transparent netchains can only exist if the actors are prepared to sacrifice some of their autonomy to the netchain. Because the netchain is not at all a hierarchical structure, it probably fits better in small power distance countries (UK, Scandinavia, Germany...) than in countries of large power distance (France, South-East Asia, most Latin, Arab and African countries).

The third dimension opposes masculine to feminine cultures. Masculine cultures (Japan, USA, UK, most Latin and Central European countries) hold the premise that people can basically not be trusted, so if you want them to behave you need good precautions. They favour fighting as the best way to resolve conflict. The economic model includes fierce competition, and metaphors like 'predator', 'crushing the competition', 'win-win' abound. In

the USA, aggression in a business context often takes the form of lawsuits between individuals or companies. In a US-based netchain, one would expect to see a 'chain leader' aggressively trying to dominate the other actors. Wal-Mart is a case in point. In masculine, collectivist countries, violence between groups, or violence against symbols of an out-group, are common. Winning may be worth a lie or a bribe, which obviously destroys transparency. As consumers, people from masculine countries hold that 'big is beautiful'. Food scares are perceived as enemies to be fought.

In culturally feminine countries, talking is preferred over fighting. Cooperation, not competition, is popular. Of course, competition and disagreements still occur; they tend to go under ground and be hard to pinpoint. Scandinavian countries and the Netherlands, are feminine countries. Slovenia, Portugal and France are also fairly feminine. Feminine societies are often good in agricultural production. The Dutch context of cooperative egalitarianism is conducive to a positive attitude towards transparency; it is seen as morally desirable and economically beneficial to the netchain as a whole. That is why the Dutch have a strong co-operative tradition.

Handling the unknown is the fourth basic problem of social life. Life is fraught with unpredictability. Some cultures (e.g. those with Greek and Latin heritage, and Japan) cope with these by adhering to strict dogmas and principles, e.g. concerning food taboos. These cultures are likely to be fearful of novelties such as GM food or, more generally, foreign food (Hofstede, 2002a). This trait equally affects organizational and political life. Rules are important. As producers, they adhere to tradition and are inflexible about that.

People in uncertainty-tolerant cultures (e.g. Chinese, Scandinavian, Anglo) cope with the unpredictable by 'preparing for the unexpected'. They are relaxed about strange things. They will eat anything and like innovation. They will easily change a deadline or contract if new facts arise. When they cooperate, people from the two types of culture may clash over agreements and exceptions.

The fifth basic problem concerns the Now versus the Future. In most Western and African cultures, the Now prevails. Short-term results are expected, and people are not expected to curb their desires. As consumers, people wish to 'keep up with the Joneses'. In business life, the next quarter is more important than the next generation. Spot markets are found more often than long-term agreements, and of course this is not conducive to chain integration.

In most countries of Southeast Asia, particularly in China, it is the future that counts. People are industrious; working and saving are virtues. The Chinese are reputed for saying 'If you keep an American waiting long enough, he'll sign anything'. The Netherlands are moderately long-term oriented and therefore known within Europe as the 'Chinese of Europe'.

These five dimensions do not operate in isolation as the introduction may suggest; in reality they operate together, constituting the distinct identities of national cultures. The discussions on institutional mechanism, transparency and national culture can be linked and merit research. For instance, if there is a 'chain leader' then that actor will behave as a principal to the other ones. In the case of food, the big retailers (e.g. Wal-Mart, Safeway, Tesco, Ahold...) have already done so and they have a firm hold on their producers. For these producers, transparency means they have to adhere to strict rules for providing information down the chain.

In many cases, international netchains cannot just be put up in a day. Due to a combination of differences in culture and in wealth, it will take education and mutual adjustment for netchains to develop. For instance, today's food safety criteria were not designed for the circumstances of production that prevail in many third-world countries. They

will have to be adapted to those circumstances, and local producers will have to be educated in them. Achieving transparency under such circumstances is a very challenging task.

Ahold has attempted to develop local quality systems for fresh produce in Asian, African and Latin American countries. Recent economic developments have put a temporary halt to these activities. One project that was completed is the TOPS project 'Best in Fresh' in Thailand (see www.klict.org). The project involved a 'preferred supplier program' that forced suppliers to comply to certain minimum standards. Yet after the Dutch left, the Thai turned back the clock. In the words of Boselie (2002, p. 25): '*Personalistic business relationships remain a latent threat to preferred supplier programs in environments that can be characterised by a high degree of informality*'. In the language of the culture discussion above, measures issued from an individualist perspective don't automatically work in a collectivist context. Thai food manager Wallaya Chirathivat (in Grievink et al. 2002) says it in this way: '*I think that it is very important to maintain an open mind and to pay special attention to the specific cultural conventions of doing business in foreign countries*'. She also asserts '*A global brand can never penetrate the Thai food market*'. The future will tell.

6. Concluding remarks

Transparency is a fashionable notion, but it is more than that. It has very important implications for the benefits of consumers, as well as the livelihood of farmers and international competition. Technology push for new ICT to enable transparency is still in full swing. But the possibilities and limitations of transparency are ultimately limited by the social systems in which it operates. Therefore, studying it requires the interaction of β and γ disciplines – technological with social sciences. The last word on transparency has not been said by any means.

Our attempt to operationalise transparency as a concept integrating β and γ can be found in Hofstede (2003). That article distinguishes three types of transparency, depending on whether transparency is aimed at the past, present or future.

History transparency is needed to track and trace products. Its main driver has been the need to contain calamities. It should enable the netchain to respond quickly and effectively as soon as defective products cause any damage. In the case of agri-food netchains this usually means consumers fall ill after consuming a product, but it might also mean defective products are intercepted before reaching consumers. In such a case, the cause of the problem must be traced and any other products that have become dangerous for public health have to be destroyed.

Some preconditions hold for history transparency. Standards are needed for product identification, and agreements are needed about procedures, e.g. keeping batches separate and cleaning equipment, so that contamination does not spread. And all parties have to record their manipulations with the products, using the same or at least compatible identification systems, so that the identity of small product units can be preserved through the netchain. In the egg case of figure 1, achieving history transparency was one of the aims. Because of this, the actors needed to agree on batch size and on not mixing batches, which turned out to be tough going. Once agreements of this kind have been reached, no communication is needed in the daily processes of the actors in the netchain. The data can be kept in a central repository (see e.g. Wilson and Clarke 1998) encrypted by keys, and need only be accessed in case of emergency. In the food sector, history transparency is more and more being enforced by law or by retailers such as AHOLD or Carrefour who anticipate future regulations.

A netchain can use history transparency as a marketing device. Netchains incur costs when they introduce history transparency, but such transparency could be made to increase

the products' value. Customers may be willing to pay more if they know the quality and provenance of the products. For instance, there have been experiments where high-quality meat chains provided a view of the living conditions of their animals through Webcams in shops. A more common quality indicator is branding or certification. Sauvée (2000) discusses a case of branding in the French tomato sector, showing that reputation is the driving force for a brand.

Operations transparency deals with information exchange between business partners that enables them to co-ordinate their operations. It includes collaborative planning and logistics. Compared to history transparency, it relies less on formal identification systems and ICT infrastructure, although these certainly are very helpful in most cases. But its main use may be to help netchain partners signal exceptional circumstances in advance, e.g. a lapse in the supply or an unexpected price change. Such signalling is likely to be at least partly voluntary.

History transparency in the form of traceability requirements is usually imposed on a netchain from the outside. The other two are usually voluntary, and are not always distinct. Rather, they involve different levels in the organisation. Strategy transparency takes place between managers or R&D personnel, while operational transparency is part of the routine of logistics and inventory planners.

In a European context, history transparency is the most usual driver for netchain integration. Agri chains that involve third-world countries are more likely to start with building some operational transparency, that is, with creating some sort durable chain relationship of information exchange, before they consider the chain-level investments needed for traceability.

Strategy transparency looks into the future. It involves sharing not only operational, but also strategic information. It might also involve co-operative innovation. It can be formalised, as in the case of joint ventures or licensing of patents. Or it could be informal. Uzzi (1997, p. 46) presents a simple case of strategy transparency:

A typical example (...) was described by a manufacturer who stated that he passes on critical information about "hot selling items" to his embedded ties before the other firms in the market know about it, giving his close ties an advantage in meeting the future demand.

It is to be hoped that initiatives to increase transparency will not remain limited to imposed history transparency with its defensive stance, but will continue towards operations and strategy transparency. Big business, not big brother.

7. Acknowledgements

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