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**Food, Power, Intellectual Property and  
Traditional Knowledge – A Food Systems Overview**

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# Food, power, intellectual property and traditional knowledge - a food system overview

by Geoff Tansey<sup>1</sup>

## A. Introduction

Millions of small farmers, herders, fisherfolk and artisanal producers of foodstuffs, in whom traditional and indigenous knowledge about food production reside, face an enormous challenge if their knowledge, livelihoods and skills are to thrive and be rewarded in the future. So too do policy makers wanting to support their development and safeguard their place in the food system.

This short paper provides an overview of developments in the food system of the industrialised world, which is being globalised today.<sup>2</sup> This background puts into context questions about intellectual property rights (IPRs) and traditional and indigenous knowledge (TK). While some TK-based producers may be able to use various tools in the food system, including IPRs, the prospects for them doing so successfully and on a scale that would enable the majority of them to survive, are remote without some fundamental changes in the direction of current trends.

### 1. Food system basics

The food system connects the:

- *Biological*: the living processes used to produce food and their ecological sustainability.
- *Economic and political*: the power and control which different groups exert over the different parts of the system.
- *Social and cultural*: the personal relations, community values and cultural traditions which affect people's approach to and use of food.

The various actors in the system juggle these as they seek to pursue their interests. Four key issues lie at the heart of today's dynamic and changing food system • power and control, risks and benefits: who will have what power over it, which of the different actors in the food system will get how much out of it and who will get the benefits and carry the risks arising from different activities.

Today's food system has a *history* in which globalisation - of basic food crops - has taken place over thousands of years, but especially since the European conquests, and is now continuing in new forms. Much food crop development has been based on a sharing of knowledge and materials among

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<sup>2</sup> The food system discussion is based on Tansey G and Worsley T. *The Food System – a guide*. London, Earthscan,

farmers. An historical understanding of why the system is like it is, is a necessary base for looking at future developments but beyond the scope of this paper.

The food system is also a *biological* system relying on a well-functioning biosphere on which human activity is having an increasing impact. Today, there are some who seem to think, but do not explicitly say, that *in extremis* we can invent our way out of any environmental problem or change we might cause. Others seem to hark back to some idyllic environment before human hands reshaped it and oppose any interventions. Neither extreme seems appropriate for sustainable human development. As the World Commission on Environment and Development noted in *Our Common Future* “there are broad areas of the Earth, in both industrial and developing nations, where increases in food production are undermining the base for future production”. The long-term sustainability of food production is essential and poses a challenge to current dominant production systems. This is an area where traditional and indigenous knowledge may have an important role to play in guiding development of sustainable production systems.

Finally, our *human needs* and wants, physiological and psychological, social and cultural, are played out through food. These needs are complex and interact. The prevailing norms and laws governing activities in the system result from the way particular interests are able to shape the legal framework.

It is upon this background that the key actors in the system - farmers, input suppliers, traders, manufacturers/ processors, distributors, caterers and consumers - operate. There are differences of interests within any group, eg between small and large farmers but these will not be discussed here.

## **B. Trends among key actors**

### **1. Farmers**

Farmers are at the riskiest end of the food system. They are dependent on uncertain and increasingly unpredictable environmental conditions and macro-economic policies over which they have relatively little influence. As small-scale operators buying from and selling to larger operators, they are increasingly squeezed by them. This squeeze also helps fuel consolidation of farms and increasing farm size.

The key trends in farming are for there to be ever fewer farmers and increasing farm sizes. Labour is being replaced by capital investment in intensive farming systems – machinery, fertilisers, pesticides – and mixed farming enterprises replaced by much more limited operations focussing on cereals, dairy, meat or even more monocultural, factory style production units for poultry and pig production. This has shifted employment and skills off the farm into factories producing specialist inputs for farmers. It has also moved farming into a more industrialised style of production, with inputs and outputs and waste products, which places less emphasis on cyclical processes within an ecological balance. These latter feature in TK-based farming systems.

A shift to capital inputs both increases the capital required to get into and remain in farming, and fuels the indebtedness of farmers. As primary commodity producers, farmers now need to produce more and more to buy the same quantities of other goods as the terms of trade have shifted against them. Less

and less of the money spent on food in industrialised societies goes to farmers, with the decline in the US going from some 40 cents in every dollar in 1910 to just above 7 cents in 1997.<sup>3</sup>

The nature of farmers' skills is also changing in the industrialised approach to farming. While various studies show that relatively small farms are the most efficient in producing food from a given area in usually complex polycultural systems, this production depends on high levels of labour input, local knowledge and management skills which are typical of TK-based systems. This is not the measure of efficiency used for modern farms, however, which look at output of a specific crop or commodity per unit of labour and capital invested.

Critics of industrial farming want to look more broadly at the economics involved than just production costs, ie, at the efficiency of resource usage and environmental sustainability. They also question the level of subsidies, with OECD figures for 1998 putting the producer support estimate of gross transfers from consumers and to agricultural producers in the OECD countries at \$274 *billion* and total transfers at \$362 billion. The EU overproduces grain leading to large costs in storage and export subsidies and now it has become cheaper to pay farmers to produce nothing (set-aside) than to buy their grain.<sup>4</sup>

Though farmers react to changes in the food system, rather than lead them, thanks to the historical and continuing power of landed interests they still retain a powerful lobby in most developed countries. But the power is often with larger rather than small or marginal farmers. Only rarely, as happened in the Highlands and Islands of Scotland in the late 19<sup>th</sup> century with the crofters (small-holders), are the property rights of land owners curtailed in the interests of supporting traditional farming communities.

## 2. Input suppliers

Before the industrialisation of agriculture, farm supplies were mostly generated on the farm. Draught animals, raised or bought, for power and ploughs, and small pieces of equipment, were produced locally. With the development of capital-intensive, high-input agriculture, farmers increasingly rely on outside suppliers to provide their tools, buildings, fertilisers, seeds, fuel and feedstuffs. Most of these suppliers have grown to become huge conglomerates, often servicing a global market and taking a global view of their business. They include:

- Agro-chemical industries
- Seed producers and feed manufacturers
- Biomedical companies
- Equipment and energy

Input providers need not be geographically based, can distribute their products over wide areas and want to maintain and expand their markets. A few large companies tend to be dominant in each market. As pressures mount for changed practices to meet environmental concerns, these large input companies are diversifying or regrouping to remain important players. For example, seed producing companies, until recently usually local or national concerns, are being bought by the major chemical industries which are also moving into genetic engineering.

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<sup>3</sup> Halweil B. Where Have All the Farmers Gone?. *Worldwatch*, September–October 2000: • 28.

<sup>4</sup> Clunies-Ross T and Hildyard N *The politics of industrial agriculture*. London, Earthscan: 16• 17, 1992.

Their size helps gives them the capacity to operate large-scale R&D facilities, and, as governments increasingly fund basic research from which farmers cannot benefit directly, these companies become the key beneficiaries of publicly-financed research. As the Nuffield Council observed, there are “six major industrial groups who between them control most of the technology which gives [them] the freedom to undertake commercial R&D in the area of GM crops.”<sup>5</sup> The increased scale of R&D has led to a neglect of low cost, locally specific technological development that could improve the effectiveness of more extensive and TK-based farming systems.

### 3. Traders

Traders • importers and exporters, brokers and merchants • are the least visible group of actors between farm and mouth. The world's food trade is a massive business in which commodities from developed countries dominate. Primary commodity exports also make a significant contribution to trade in many industrialised countries. Traders are tending to become fewer and bigger with ever larger market shares. The world's grain trade, for example, is dominated by six companies.<sup>6</sup> Although some products are traded in packs, such as tinned salmon, most are traded in bulk for further processing into food and beverages or for use as animal feedstuffs. Around five per cent is used as raw materials for industry such as textiles.

Timely information about growing and market conditions throughout the world is crucial to traders' success and the biggest players are developing their own information systems using the latest technology. Some companies, such as Cargill, are extending their activities right through the food chain into producing animal feed and ingredients, meat (beef, chicken, pork and turkey) and food processing. Large-scale commodity traders are likely to be less interested in the smaller volume of production and often non-standardised products produced by TK-based farming systems.

### 4. Workers

The food system is a major employer but as it becomes more industrialised fewer people work on farms and more work in supplying inputs and transporting and transforming the outputs. For workers in any part of the food system, however, wages and conditions tend to be poorer than average with the manufacturing and processing industries usually the best paid.

Workers' organisations are concerned that the trends throughout the system are towards the replacement of human labour by machinery - which does not bargain - and towards increasing the amount produced per person employed. Usually the most skilled and costly processes are mechanised first. Another trend is to replace full-time jobs with part-time jobs. Overall workers have little if any say in

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<sup>5</sup> These are: Agrevo/Plant Genetic Systems, ELM/DNAP/Asgrow/Seminis, Du Pont/Pioneer, Monsanto/Calgene/Delkalb/Agracetus/PBI/Hybritech/Delta and Pine Lane Co., Novartis, and/Mogen/Avanta. Nuffield Council on Bioethics. *Genetically Modified Crops: The Ethical and Social Issues*. London, Nuffield, 1999: para

<sup>6</sup>Five of them are private • Cargill and Continental (both USA), Dreyfus (France), Andre/Garnac (Switzerland), Bunge and Born (Brazil) • but Mitsui/Cook (Japan) is publicly held. In the USA, the world's largest grain exporter, the six companies account for 95 per cent of US corn and wheat exports

what goes on in the system. Such trends are likely to be antithetical to the values, labour and social relationships in TK-based farming systems<sup>7</sup>.

## 5. Manufacturers and processors

Food processors often started as preservers of food but now often manufacture foods from a basic set of ingredients. By having wide-ranging sources of supply, they can smooth out climatic variations affecting farmers while still keeping produce flowing through their factories. The processors grew, diversified and became the biggest players in the food system in many countries until the 1980s, particularly in Britain and the USA.<sup>8</sup> By the early 1990s, in Europe, most product markets were quite concentrated with the top three suppliers tending to dominate. The manufacturers had developed branded products targeted at increasingly segmented markets using brand images to attract customer loyalty.

In 1993, the chairman of Unilever, the Anglo-Dutch multinational, called brand equities 'the most valuable items in our stewardship' and saw 'the power of our brands as the engine of long-term growth'. During that year, the company spent almost 12 per cent of turnover (£3284m) on advertising and promotional investment. In the USA, three conglomerates have a high degree of vertical integration and increasingly dominate the food chain there<sup>9</sup>. Large food enterprises also often have considerable research and development budgets.

Recently there has been a spate of mergers and acquisitions in the food industry, which is still continuing, as firms gear up to better serve global markets and also to counter the growing power of multiple retailers (see below). Brands still remain a crucial part of their strategy although Unilever has announced it will cut out three quarters of its 1600 brands to focus on 400. Achieving some kind of brand identity is a major challenge for TK-based producers selling into markets dominated by brand advertising.

## 6. Distributors - wholesale and retail

Wholesale and retail distributors move foods to the point of sale. The trend with them has also been to ever larger businesses, with multiple retailers coming to dominate food distribution in many industrialised countries in the 1980s and many small shops and wholesalers being squeezed out. In Australia, the UK and the USA, for example, a few companies control the vast majority of the food moving into consumption, producing a highly concentrated food retailing sector. In Britain by 1993, just five multiple retailers handled 65 per cent of the retail food trade.

Many multiple retailers moved into *own*-branded goods and their shops became brands in themselves. Their aim is to have shoppers meet all their food shopping needs in their store. Their basic

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<sup>7</sup> Gurdial Singh Njjar argues "the Western, industrial model of innovation is...antithetical to the ethical and social values and needs of many Third World Countries and peoples. It is critical, therefore, to redefine 'innovation' in a manner which is protective of the creativity of indigenous peoples" in *In Defence of Local Community Knowledge and Biodiversity: A Conceptual Framework and the Essential Elements of a Rights Regime*. Third World Network, Paper 1

<sup>8</sup> By 1988, according to OECD, in Western Europe as a whole, the sales of just eight firms • Unilever, Nestlé, BSN, Cadbury Schweppes, ABC, United Biscuits, Hillsdown, and San W. Berisdorf • made up 70 per cent of the US\$250 billion food and drinks market.

<sup>9</sup> Brian Halweil, "Where Have All the Farmers Gone?", *Worldwatch*, Sept/Oct 2000

claim to consumers is a 'trust me to deliver whatever you want in food' – whether it is packed, branded, or made for the retailer and labelled as such.

Multiple retailers now influence the products produced and methods used by their suppliers. Most major multiples in Britain, for example, have developed variations on integrated crop management systems their growers must adopt and often have direct relations with them. Such contacts might provide opportunities for TK-based producers. Today, as organically grown products are having something of a consumer boom they are investing in research into them, encouraging suppliers to change over to produce organically and strongly marketing organics. In the UK, retailers have also, after considerable consumer and public pressure, led the demands to their suppliers to remove genetically-engineered ingredients from all their own brand products and are now doing the same for the feed fed to animals used in those products.

National multiple retailers are increasingly looking to expand into other countries – with Migros of Switzerland and Tesco in the UK expanding in some developing countries and WalMart from the US acquiring Asda in the UK. Multiple retailers make great use of information technology with laser scanning linked to stock control and just in time delivery allowing smaller warehousing and less stock to be kept. It also allows slow moving lines to be dropped more quickly and a closer eye to be kept on consumer buying trends. The switch in market power has meant that the retailers have been able to capture a greater share of the money to be made out of food.

## 7. Caterers

More and more food is consumed outside the home. For retailers this represents lost business, but it is a growing trend in rich world markets. In 1980, only about one in 12 meals were eaten out in the UK, but this rose to one in seven in 1990, still a long way short of the one in 2.5 in the USA where almost half of food dollars were spent on meals and snacks away from home then.<sup>10</sup>

Caterers are now the single largest employers in the food system in industrialised countries. There is an economic and technological revolution going on in catering with large catering companies developing which operate in many areas – both as contract caterers to a closed clientele in factories and offices and consumer caterers using branded outlets. Technical changes, such as cook-chill and cook-freeze, and other centralised-production methods are also being introduced. These changes concentrate production facilities and require well-controlled storage and distribution networks. Such systems demand high technical and safety standards for effective operation. In-house canteens are also being replaced by contract caterers. Caterers, not eaters, determine the ingredients, recipes, dishes and cooking methods for markets based on a whole range of market information about consumer taste.

Standardised product delivery through widely-advertised, banded outlets is also growing, with McDonalds perhaps the best known globally and the largest franchised food service organisation in the world. As these spread they pose a threat to the multi-billion dollar, informal street food businesses that provide much of the catering in developing countries and tend to use local produce and make local dishes. These are rarely supported with public provision of clean water but have a significant role to play in feeding millions of people in developing countries cities according to FAO<sup>11</sup>.

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<sup>10</sup>Percent of Income Spent On Food Holds Steady' in *Food Review*, USDA-ERS, July • September 1992: 15 (2):

<sup>11</sup> FAO. *Food and Nutrition: Creating a Well-fed world*. Rome, FAO, 1992.

## 8. Consumers

Not all eaters are consumers. Consumers tend to be people in urbanised, industrialised societies who spend money on goods and services. But there has been continual extension in the reach of the market and an increase in the numbers of consumers world-wide. While women's traditional responsibility for the preparation of food from basic ingredients has been transferred to the world of supermarkets, it is still usually women who take responsibility for meal planning and food purchases. They have to balance the household budget.

For consumers, the skills needed to select and prepare food to eat are changing. Control of what goes into foods has passed to others. People have ceased to be producers, processors and preservers of food at home as these functions became centralised in larger and larger enterprises, and more and more people, especially formerly domestically-focused women, entered the job market. There is a loss first of skills in handling raw foodstuffs and then even of the recombination skills of convenience ingredients for meals.

Shopping into an increasingly difficult activity, with individual shoppers finding themselves facing 20,000 or more items in a supermarket, many with implicit or explicit nutritional claims. Food actually fulfills very complex roles in our lives and is used for many purposes, of which nutrition is but one. Shoppers also have a wide range of concerns - from individual concerns over the affordability of what they wish to buy to the desirability of a product from a health, ecological, acceptability to other family members or animal welfare considerations. To deal with selecting from such a variety in a short time, shoppers use various kinds of discounted decision making, and advertising is a key method used to influence this. Those marketing food also spend huge amounts on market research and use this to pitch their adverts to appeal to one or more of the different requirements food meets in people's lives.

Consumers are individuals and as such have little direct effect on the food system except when they act en masse, for example stopping buying beef during the BSE crisis in Britain, or when sufficient numbers boycott certain goods or act through consumers organisations. Their greater role lies as citizens helping to shape the rules for the food system through the political process<sup>12</sup>. It is here that they might have the most influence is supporting policies that support TK-based farming systems.

### C. Constraints and concentration

#### 1. Limited demand

The major actors in the food system supplying the industrialised world face one central fact - that of limited demand. You cannot increase your food consumption two, three or four fold and survive for long without major health problems. And in the industrialised world, despite the existence of some degree of food poverty, farming faces a central problem of over-production and food retailers one of over-fed customers who spend a declining amount of their disposable income on food. This means that the main actors in the food system face pressures:

- of increased competition for the money spent on food,

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<sup>12</sup> Gabriel Y and Lang T. *The Unmanageable Consumer – Consumption and its Fragmentation*. London, Sage, 1995.

- to increase use of technology to generate greater returns to investment,
- to seek increased productivity from the labour and capital employed, and also
- to diversify their activities.

One response has been to divide markets up into ever more segments and market products to appeal to different consumer groups within those segments. This leads to a proliferation of niche products that appeal to different health, environmental, animal welfare, development and other interests. It also provide more opportunity to produce more 'added-value', or profitable, products. This kind of development also offer opportunities for foods produced using TK. Companies also look beyond their saturated markets and expand into global markets.

## **2. Concentration and control**

There have been long term shifts in the balance of power between these groups of actors - from producers to manufacturers and processors and, in the last few decades, to multiple retailers who set the terms for their suppliers and may even charge shelving fees for product placement and dictate the prices for their sales.

There are two key trends, however:

1. An increasing economic concentration of economic power within all sectors. Fewer and fewer organisations and firms account for larger and larger market shares.
2. To seek ever more controlled systems, relying less on the vagaries of weather, human labour or environmental fluctuations. The actors use various tools to help achieve greater control, in particular scientific knowledge and technological developments, information and management.

## **D. Tools for control**

### **1. Science and technology**

Historically, technological developments have not necessarily depended on a correct scientific understanding of why something works. Trial and error invention produced many new technologies before the science behind them was understood. It is still the basis of much innovation in TK-based systems. Improved scientific understanding underpins modern technological development, such as that in modern biotechnology. However, its exploitation through trial and error technological development, notably in genetic engineering, does not require a thorough understanding of how organisms work, how the whole genetic code is expressed, and so on. It is, literally engineering with new materials. Even without knowing in precise detail what happens when genes are added, their macro effects can be seen and used to redesign living organisms.

The different actors in the food system finance a wide range of research and use increasingly sophisticated technologies. Those who can introduce innovations first stand to gain the most benefit. Technology, however, also concerns the organization, management and other knowledge that is embedded in tools.

Science and economic interest can become confused, as R.C. Lewontin, professor of Zoology at Harvard University, argues happened with high-yielding hybrid maize. In fact, high-yielding open pollinated maize could be bred but this is not in the interests of private companies which need repeat sales of hybrid seed each year. However, thanks to the way in which it was developed it has also become something of a dogma in the agricultural research institutes that hybrid maize is the only way to get high yields.<sup>13</sup>

### ***(a) From public to private research***

Most research and development over recent decades has focussed on capital intensive, high input types of farming. Historically, most agricultural research and development (R&D) was done to produce results that were then freely extended to farmers. Society expects to benefit from such investment in terms of greater food security through improved farming practices. More recently, however, some industrialised country governments have withdrawn from near market research and concentrated on basic research, leaving it to private firms to do more market oriented research. There has also been a switch in funding away from the farm level to other areas of the food system, eg more post harvest and food safety concerns.<sup>14</sup>

The expansion of interest in the private sector in agricultural research is largely due to the powerful new tools embodied in modern biotechnology. Re-engineering crops to link their structure and properties more closely to the interests of food processors or to the use of proprietary chemicals has drawn new players into the business of seed production from the chemical and pharmaceutical industries. These have a long history of using patents as business tools and require some form of control over their rights both to their research and to prevent reuse of their products, such as seeds, without their permission or further payment. They support moves to restructure the legal system by extending patents to life forms to control the use of discoveries and innovations.

### ***(b) A broken bargain***

The growing use of intellectual property rights (IPRs) in agricultural R&D has fuelled a strong sense in developing countries and in some in the international agricultural research community that an implicit bargain has been broken – with germplasm used in breeding programmes largely provided by the south for free being still in the public domain but science becoming increasingly proprietary.<sup>15</sup> Indeed, Joseph Stiglitz, former chief economist at the World Bank, argues “basic research and many other forms of knowledge are not, and almost certainly should not be, protected by an intellectual property regime. In these areas efficiency requires public support. And public support must be at the global level.”<sup>16</sup>

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<sup>13</sup> See box 8.3 in *The Food System – a guide* and Lewontin RC. *The Doctrine of DNA – biology as ideology*. London, Penguin, 1993

<sup>14</sup> In the USA, the focus of private agricultural R&D has changed from agricultural machinery and post-harvest food-processing research (about 80% of the total in 1960) towards plant breeding and veterinary and pharmaceutical research. Some 70% of the chemical research related to agriculture is done in just three countries, the USA, Japan and Germany. These figures are based on work going on at the International Food Policy Research Institute led by Phil Pardey .

<sup>15</sup> Serageldin I. International Cooperation for the Public Good: Agricultural Research in the new Century. Paper presented at the Global Forum on Agricultural Research (GFAR), Dresden, 21–23 May 2000 .

<sup>16</sup> Stiglitz JE. Knowledge as a global public good. In Kaul, I et al. eds. *Global Public Goods: International Cooperation in the 21<sup>st</sup> century*. Oxford, OUP, 1999: 320 t

The development of IPRs legislation in agriculture – both PVP and patents – is already having some effects on the exchange and use of plant genetic resources. In the USA, for example, one researcher found public sector breeding programmes have found it harder to get materials from companies, which has interfered with their ability to release new lines and train students.<sup>17</sup> The director of one international agricultural research institute says that the expansion of plant breeders rights is leading some collaborators no longer to send their best lines for use in the breeding programmes, but the second best which diminishes the results for everyone.<sup>18</sup>

There are growing concerns that privatisation will affect the future direction of research and the nature of science, with the results of scientific research not being shared as openly as in the past. The ability to influence the direction of research, and capture its results, however, is of vital interest to the major actors in the food system. Those who can introduce innovations first stand to gain the most financial benefit, greatly affecting their performance. Areas where companies cannot capture benefits such as higher productivity low-input farming for poorer farmers using TK-based systems are less likely to be funded than those where patentable or controllable products, such as hybrid seeds, will be produced.

## 2. Information

More generally, the ability to monitor, use and control information is one key to success for the actors in today's food system. Information technology has transformed information systems - both public and private - offering a degree of complexity, immediacy and control undreamt of only a few decades ago. It can be used to provide detailed profiles of customers, or about growing conditions and price levels around the world. This information is often very specialised. It is privately produced, normally kept confidential and must be expertly processed to turn it into useful knowledge.

Consumers and farmers tend to rely on publicly available information while larger actors use more private sources. This information may be in the form of R&D results, market research or expert advice. The capacity of the main actors in the food system to gather, interpret and use information is much greater than an individual's. Professionals study people's needs, wants, hopes and fears, so sales messages can be designed. Slick names are showered on increasingly segmented sections of the population by market researchers<sup>19</sup>.

The spread of global media, broadcasting similar images across the globe help fuel product globalisation as Coca Cola's chairman in the early 1990s, Roberto Goizueta recognised: "In many important ways, the world's markets are also becoming more alike. Every corner of the free world is increasingly subjected to intense and similar communications: commercial, cultural, social and hard news. Thus, people around the world are today connected to each other by brand name consumer products as

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<sup>17</sup> Riley K. Effects of IPR Legislation on the Exchange and Use of Plant Genetic Resources. Paper presented at GFAR, Dresden, 21-23 May 2000. Available at: <http://www.egfar.org>

<sup>18</sup> Personal communication, GFAR, Dresden

<sup>19</sup> For example, the Target Group Index gave six attitude groups of women from 15 to 44 years old the following names:

*Self Aware* - concerned about appearance, fashion and exercise

*Fashion Directed* - concerned about fashion and appearance, not about exercise and sport

*Green Goddesses* - concerned about sport and fitness, less about appearance

*Unconcerned* - neutral attitudes to health and appearance

*Conscience Stricken* - no-time for self realization, busy with family responsibilities

*Dowdies* - indifferent to fashion, cool on exercise, dress for comfort

In *The Food System*, *op cit*: 148-150

much as by anything else.” This global spread of images of the ‘good life’ can undermine the value people see in TK-based systems and alter people’s aspirations, especially if their culture is not given coverage in local mass media.

### **3. Management**

Work organisation has shifted in the past 100 years from craft-based, small-scale production through a large-scale, mass production phase, which is still dominant, to a newer lean production phase, which is likely to dominate in the future. This latter uses just-in-time manufacturing and stocking techniques, similar practices to those pioneered in the car industry. In the UK, for example, the multiple retailers spent hundreds of millions of pounds in the 1980s to develop the logistical system to most effectively supply their growing number of sites - which generally led them to establish a few depots to which suppliers had to deliver. Such systems require the smooth function of the supporting infrastructure which the recent fuel protests in Europe showed can all too easily be disrupted.

### **4. The social challenge**

The challenge for societies and political entities is to set the framework within which the actors work in the food system - a framework based on a whole range of policies affecting food but rarely viewed overall as a food policy<sup>20</sup>. These are used to set up the laws, rules and regulations which govern the actors, some of which have been created by other laws, in the case of limited liability companies and given rights as judicial persons as if real persons. Some of these laws were rapidly developed during the industrial revolution to promote investment and innovation but limit the risk of those involved.

It is in this context that the debate on IPRs, and the potential of TK to benefit its holders, in the food system need to be viewed. Technological innovation and IPRs are used as part of the struggle for market power, part of the fight to capture benefits and limit risks, to extend power and control in various parts of the food system by some old and some new actors. The market structure today is increasingly oligopolistic and both technological innovation and IPRs may be used in the struggle for market power.

### **5. Technological innovation and market power**

Technological innovation has long been seen as a way of entering an industry, and patent-protected innovation used as a means of gaining legal quasi-monopolistic control of certain products and sectors. It occurred in the 19th century, when inventors like George Eastman (Kodak) and Thomas Edison, sought patents to enable them to capture monopoly profits.<sup>21</sup> By institutionalising innovation in R&D labs in the 19th century “large corporations sought to control technological change as a means of protecting and fortifying their positions in the industry” argues Reese Jenkins in his study of Kodak.

Today, IPRs linked to technological innovation are a tool in the battle for market power. “Companies now seek protection through IPR in more countries than they did in the past in order to (i)

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<sup>20</sup> The aim of food policy should be to ensure a safe, secure, sustainable, sufficient, nutritious diet for all, equitably

<sup>21</sup> Jenkins R. *Images and Enterprise: Technology and the American Photographic Industry 1839 to 1925*. Baltimore, Johns Hopkins University Press, 1975

expand their market share, (ii) prevent competitors from becoming active in those countries, or (ii) as a bargaining tool to negotiate favourable local agreements” argued a study of agricultural biotechnology in the early 1990s<sup>22</sup>

Biotechnology may bring another power shift in the food system, away from retailers and food manufacturers, to those industries supplying the primary producers. However, the actions of some companies over the introduction of genetically modified soya in refusing to go for segregation of the crop, made a mockery of the idea of consumer choice and has infuriated the European public. It also represented a major defeat for the retailers in their claim to be able to offer people choice. So far, they have decided to fight back and insist on being able to choose the ingredient that go into their products and have sought non genetically engineered sources, providing traditional farmers with new opportunities.

## E. Restructuring the regulatory framework

Pressures grew in the 1980s to revise the regulatory framework governing biological resources, partly due to the technological developments now possible. Three agreements are central to the revision of this regulatory framework – the Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS), the Convention on Biological Diversity (CBD) and the International Undertaking on Plant Genetic Resources for Food and Agriculture (IU). The CBD is a framework agreement that leaves parties free to implement it through their own legislation. The IU is still being renegotiated to bring it into harmony with the CBD, to regulate access and benefit-sharing specifically for plant genetic resources for food and agriculture. It also covers the *ex situ* collections of germplasm held in the gene banks of the international agricultural research centres belonging to the consultative Group on International Agricultural Research (CGIAR).

### 1. The CBD and IU

The CBD’s three objectives are:

- The conservation of biological diversity
- The sustainable use of its components
- The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.<sup>23</sup>

It brought genetic resources formally under national sovereignty. It requires countries to take measures to ensure the conservation, sustainable use and benefit sharing from use of those resources and made access to these subject to prior informed consent – of the state rather than the community involved. However, the CBD developed from a natural resource, mining mentality – in which developing countries felt they had undervalued wild biodiversity of use to developed countries and major industries, such as pharmaceuticals. But for agriculture, the mining, winner-takes-all mentality that the CBD seems to have stimulated in relation to the exploitation of wild biodiversity pays scant attention to the differing nature of agricultural genetic resources which, as pointed out above, have been developed, exchanged and mixed

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<sup>22</sup> van Wijk J, Cohen JI and Komen J, *Intellectual Property Rights for Agricultural biotechnology – Options and Implications for Developing Countries*, ISNAR Research Report 3, The Hague,

<sup>23</sup> Article 1. It also goes on to say “including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate

up around the globe for millennia. Indeed, ‘wild’ biodiversity rich countries like Brazil, are agriculturally biodiversity poor, depending for 95% of their food on crops that came from elsewhere.

The CBD failed to recognise sufficiently the special needs of agriculture and only later, in decisions of the Conference of the Parties (COP), did it recognise these and support the renegotiation of the IU which was premised on germplasm as a common heritage of humankind. It recognised that current crops have been developed by the activities of farmers over millenia. Renegotiating the IU is proving a very difficult task. The most recent negotiation draft text includes a provision that recognises that should any germplasm be taken out of the general pool available for further breeding by having patents taken out on it then this would create a loss to society as a whole that should be compensated by some payment into a fund to promote the use of genetic resources.

The CBD did recognise, in Article 8 (j) the need for *in situ* conservation of biodiversity and the need to protect indigenous knowledge. Article 8(j) requires states, subject to their national legislation, to preserve the knowledge, innovations and practices of indigenous and local communities insofar as that knowledge, innovation and practice serves the goals of conservation and sustainable use of biodiversity. In agriculture this comes about through its use and development in farming communities. The CBD also requires states to diffuse that knowledge, innovation and practice with the cooperation of the holders of that knowledge. It also requires states to encourage the sharing of any benefits that arise from such diffusion.

## 2. TRIPS

The TRIPS Agreement is an international legal instrument that was born out of big business interests as Peter Drahos demonstrates.<sup>24</sup> A handful of corporations and lobbyists were responsible for crafting its terms and pushing, via various developed country governments, the agreement through the Uruguay Round and into the WTO. Most notable among these was the USA where the debate about the need to strengthen the IPRs regime was couched in terms of ensuring and maintaining “its competitive advantage in the global system.”<sup>25</sup>

TRIPS<sup>26</sup>:

- creates minimum standards of intellectual protection that all WTO Members must recognise ;
- ensures that states make available to rights holders institutional procedures to enforce their intellectual property rights; and,
- provides a procedure for regulating disputes between states concerning their obligations under the agreement.

Article 27.3(b)<sup>27</sup> gives WTO Members discretion about whether or not they allow plants, animals, biological processes for the production of plants or animals and plant varieties to be patentable

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<sup>24</sup> Drahos P. Global Property Rights in Information: The Story of TRIPS at the GATT. *Prometheus*, 1995, 13: 6-19

<sup>25</sup> Quoted in May C. *A global political economy of intellectual property rights – the new enclosures?* London, Routledge, 2000: 119

<sup>26</sup> Article 7 Objectives

The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations”

<sup>27</sup> (b) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties

but requires Members to provide patent protection for micro-organisms and non-biological and microbiological processes for the production of plants and animals. Members must also either grant patent protection for plant varieties or provide protection by means of an effective *sui generis* system.

Plant variety regimes allow for the registration of a plant variety that has been discovered. Members can design their own system for the protection of plant varieties or could choose to implement the UPOV system. UPOV defines a breeder to mean the person who bred, or discovered and developed, a variety (see Article 1 of UPOV Act 1991). Such a variety must be distinct, stable, sufficiently uniform and novel. TK-based varieties do not normally meet these criteria and various countries are trying to develop their own systems although there is considerable pressure for most to adopt the UPOV system. The more approaches that are taken to this the more difficult it would be for a WTO dispute panel to decide what constituted an effective set of standards and *de facto* introduce one by looking at UPOV as the main standard.

In general, the current international IPRs regime, unlike, for example, that in the environmental arena, has been developed by a narrow set of actors with relatively little involvement of civil society as a whole. These actors have been drawn mostly from the legal and industrial fields and, as 'epistemic communities', are very influential in shaping the global regulatory framework, as John Braithwaite and Peter Drahos show<sup>28</sup>. Such "an epistemic community is composed of professionals (usually recruited from several disciplines) who share a commitment to a common causal model and a common set of political values. They are united by a belief in the truth of their model and by a commitment to translate this truth into public policy, in the conviction that human welfare will be enhanced as a result."<sup>29</sup> In the IPRs field, it is a relatively small group, representing powerful corporate interests and a profession in whose interests it is to have strong IPRs, that has driven the development of the current regime.

### 3. IPRs in the struggle for market power

IPRs in biological innovations and the new technology are used in a struggle for the future control of the basic inputs to the food system and the products sold to consumers. Those most involved in product production make the most use of patents, PVP, trade secrets and trademarks, while those closest to the consuming public a greater use of trademarks, and increasingly of databases, while some specialist producers in particular use geographical indications. As the reach of the market, especially an increasingly globalised market, goes further into developing countries so too will the major actors take use of IPRs as part of their business development strategy.

IPRs have clearly contributed to the development of biotechnology.<sup>30</sup> They have:

- Underpinned its development by private industry as they help ensure the prospect of private profits
- Contributed to a restructuring of the market and centralisation of firms. The seed industry, once the preserve of small firms, has become dominated by five major firms – in part as a response to

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either by patents or by an effective *sui generis* system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement

<sup>28</sup> Braithwaite J and Drahos P. *Global Business Regulation*, Cambridge, CUP, 2000

<sup>29</sup> Haas EB. *When Knowledge is Power: Three Models of Change in International Organisations*, Berkeley and LA, Univ California Press, 1990: 40• 41

<sup>30</sup> Barton J, Intellectual Property Management. *2020 Vision, Focus 2 – Biotechnology for Developing-Country Agriculture: Problems and Opportunities*. Brief 7 of 10, IFPRI, October 1999 .

litigation over broad patents awarded in the early days of transgenics in the US. Mergers and acquisitions were the easiest way to resolve some of these disputes, and represent the ultimate in cross-licencing.

- Increased investment in product development also requires stronger marketing ability, bigger markets and legal capacity to defend your interests, with firms putting considerable effort and money into both.

The biotech firms are interested in the major grains and industrial crops in developed and major developing countries, such as India, Brazil, and China and they control many of the advanced technologies needed to reshape them. As John Barton pointed out in a recent talk in Geneva, this challenges those working to benefit poor farmers to rethink who they are working for and in what crops and areas, what kinds of partnerships can be made, and whether the technologies may be applied royalty free for the benefit of poor farmers often using TK-based systems. There are a number of concerns for developing countries:

- The effects on seed prices, which he expects to be increased in the 10s of percent not hundreds – but is a reason why public seed provision will be needed in countries with oligopolistic seed markets
- Use of trade marks, patents and PVPs to protect major developed-world markets from competition and a likely increase in the use of lawyers
- Use of patent portfolios to restrict follow-on research by potential competitors and public sector bodies – which requires countries to ensure developing world researchers have a legal right to use such research
- The need to counter oligopolistic tendencies through competition and anti-trust measures.
- The need to restrict broad patent claims and patents on fundamental innovations

The companies most keen on a genetically-engineered future for plants and animals clearly recognise the benefit of encapsulating the relations of production in the seed. So too do those who speak about the need for participatory technology development with small farmers and an agro-ecological approach to agricultural development. They argue that in seeds are farmers' strategies for managing the land and risk, with farmers in TK-based systems in the Andes, for example, using hedge rows as decentralised and farmer managed *in situ* gene banks. They also argue that agricultural biodiversity is not just the genetic resources but the economic and social systems that go around them.

## **F. A place for TK?**

### **1. In the future of farming**

The major social and economic value of TK – which includes both traditional and indigenous knowledge - in the food system is in

- providing the livelihoods of millions of people
- the types of farming it supports,
- its maintenance and development of *in situ* biodiversity
- its value in supporting production in what high tech farming regards as marginal areas, and

- in the knowledge of how to produce from low inputs sustainably in a wide variety of environments.

Various researchers, small farmers organisations and NGOs want a reorientation of both R&D and agricultural policies to support this.

However, they face major challenges given current developments in the food system in which TK is peripheral, and for many does not feature in their thinking. The kind of farming practices, the social and environmental relations involved in TK approaches to food are in many senses antithetical to those of the dominant paradigm. As Thomas Cottier notes about what happened to TK in developed countries “once the IPR systems were fully established, they undeniably contributed to the loss of traditional knowledge in industrial society. New products replaced the need of such knowledge, and generation after generation, it was increasingly lost and no longer passed on, while at the same time, standards of living were raising for most people”.<sup>31</sup>

This is a worrying prospect for those concerned about biodiversity, cultural and social development, especially in a world threatened by a major loss of biodiversity, by climatic change likely to cause upheavals in farming, and where development is not simply seen as copying the industrialised world. But, even in the UK, there are many small ventures, mostly out of the mainstream, attempting to rescue or rediscover TK in food production.

Indeed, as Terry Marsden argues, what is at stake, at present, especially with the advent of genetic engineering, is to rethink the kind of agricultural system(s) society wants and the goods it wants it to deliver.<sup>32</sup> Without an appropriate agricultural development policy – and most governments tacitly, if not explicitly, favour adoption of industrialised types of farming and pursue policies that will, sooner or later squeeze out traditional farmers – the prospects for the use of TK in the food system through the production of products entering trade from producers using TK are very limited. Development of TK-based production requires a legal, regulatory and policy framework that supports and strengthens it.

## 2. TK as biodiversity

TK-based farming systems are also an aspect of biodiversity itself. The communities practising farming using it would seem to have a right under the CBD to be sustained – if they want to abandon their way of life they may but should not be forced to but supported in building upon it. Moreover, as David Downes and Sara Laird point out “Traditional knowledge is also important to its holders as an integral part of their cultural heritage. As such, its protection is important for ensuring the enjoyment of the right to maintain and take part in cultural life recognized under international human rights instruments.”<sup>33</sup>

## 3. As custodian of agrobiodiversity

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<sup>31</sup> Cottier T. The Protection of Genetic Resources and Traditional Knowledge in International Law: Past, Present and Future. *Journal of International Economic Law*, 1998

<sup>32</sup> GEC, The Politics of GM Food: Risk, Science and Public Trust. *Special Briefing no 5*, Global Environmental Change Programme, University of Sussex, 2000: 16. Also available on the web at: <http://www.gecko.ac.uk>. See also Marsden T, Flynn A and Harrison M. *Consuming Interests – The Social Provision of Foods*, London, UCL Press, 2000

<sup>33</sup> See, for instance, Article 27 of the Universal Declaration of Human Rights, and Article 15 of the International Covenant on Economic, Social and Cultural Rights. In Downes DR and Laird SA with contributions by Dutfield G and Wynberg R. *Innovative Mechanisms for Sharing Benefits of Biodiversity and Related Knowledge - Case Studies on Geographical Indications and Trademarks*. Prepared for UNCTAD Biotrade Initiative, 1999

A key aspect of TK based approaches to food production lies in their potentially greater value in ensuring agro-biodiversity is maintained, in promoting sustainability, in offering alternatives to a dominant, all encompassing approach, and in providing a satisfying way of life for millions of people if it is suitable supported and rewarded. The major way to support the livelihoods of farmers and communities operating with TK is unlikely to be through the use of IPRs. More important is likely to be a shift in agricultural development policy to focus on supporting that kind of agricultural development.

#### 4. As sources of innovation

To date, too little attention has been paid to TK-based systems as sources of innovation – innovations that have a great potential to benefit other communities and farmers in similar situations. Some people are acting to facilitate an exchange of this knowledge, such as the Honey Bee Network in India.<sup>34</sup> Here, the most advantageous use of the TK is probably in sharing it among the range of communities practising TK based agriculture – and ensuring it cannot be captured by private interests possibly by creating an innovations register – although this has pluses and minuses.<sup>35</sup>

The long-standing approach of extension in seeking to share information freely among small farmers to allow them to improve their farming practices is more likely to benefit resource poor farmers than having it locked up in IPRs – but only if extension recognises and supports it. Agricultural extension and research would need to accept the need to marry TK's innovative capacity and farming activities with modern scientific and technical understanding to help increase the effectiveness of TK-based farming and food production systems. There is great debate about whether and in what way modern biotechnology might support this or undermine it.

Whether this sharing approach is appropriate for its commercial use by others, or those developing products in the intensive system, is more contentious. Here, the knowledge may be an input into something commercialised and as such the holders of the knowledge should be rewarded – although existing IPRs do not seem to be a particularly appropriate mechanism for this, as individual private rights. It does mean, however, that as a minimum patent applications, for example, should have a declaration of geographical origin and use of indigenous knowledge in them, if in future sale or commercialisation of the patent produces material benefits for the patentee. This is worth introducing now, even though there may not be agreed benefit sharing mechanisms yet, as it would mean there would be a baseline of information developed to assess how far such TK is used in commercially applicable patents.

However, the value of this material, eg farmers' varieties and land races, local water capture methods, companion planting practices, and use of these in the modern food system, may well be completely undercut by the expansion of industrialised approaches to farming and developments in biotechnology. The seed industry sees no immediate need for it, having easily accessible resources in genebanks. Moreover, the new life sciences companies taking over seed companies suggest that if natural materials are overpriced or made difficult to get at they will simply speed up their use of biotechnology to transfer or invent genes to achieve their desired goals<sup>36</sup>. As functional genomics reveals more and more about how genes work and subsequent work increases the ability of scientists to manipulate them the natural base is likely to be superseded.

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<sup>34</sup> Gupta AK. Grassroots innovations for survival. *LEISA*, July 2000, 16 (2): 7-8

<sup>35</sup> Downes DR and Laird SA with contributions by Dutfield G, Mays TD and Casey J. Community Registries of Biodiversity-Related Knowledge - The Role of Intellectual Property in Managing Access and Benefit. Prepared for UNCTAD Biotrade Initiative, 1999

<sup>36</sup> More or less stated as such by one industry person at the Global Forum on Agricultural Research in Dresden in May

## G. Using IPRs

Today, the major actors in the food system use a mix of IPRs to bolster pursuit of their commercial goals. The nature of the mix varies depending upon the size and type of enterprise. The new biotech-based agricultural firms strongly favour the use of patents to ensure exclusive use of their developments. They also may try to either get broadly defined patents on key processes or enough patents to achieve what those in the patent business call ‘clustering’ – building enough patents, preferable interlocking, around a product to prevent others getting into the field or ‘bracketing’ – surrounding a competitor’s patent with so many of one’s own that it cannot be commercialised.<sup>37</sup>

Competing in the patent game requires considerable resources – both to take out and maintain patents - and legal expertise to defend them. Unless you are able to defend them at least in the major markets then they are useless. Most small players are looking for larger companies to licence their inventions or buy them out to acquire the rights to use the patent portfolios they hold. Here some kind of partnership with a national body, or else a requirement on government to assist communities to establish and defend rights and prevent them being usurped is required, as indeed seems to be happening to some extent in India where government agencies have challenged patents awarded in the USA.

However, this does not seem a major route for TK supporters to go down. Other kinds of instruments may be needed to protect their knowledge as Cottier and others have suggested as well as excluding plants and animals from patentability as allowed in TRIPS. It is also likely that a *sui generis* approach to plant variety protection, differentiating between the TK and commercial sector would be more appropriate than simply the UPOV model as work by the International Plant Genetics Research Institute suggests.

### 1. Trademarks and geographical indications

Many companies make strong use of trademarks, and a focus on brands and substantial marketing investment to secure their markets. Greater efforts by them to protect brands is increasingly likely as the case of Unilever makes clear. In urban societies served by multiple retailers and saturated by advertising and media images unless producers have a major brand they will not get on their shelves, normally only the top two or three do. Another route for some firms is to become generic producers for others, notably the retailers themselves, thus leaving them to put the brand on and shift the producers roles to unknown, contracted supplier. For some products, a combination of brand [trademark] and trade secret – Coca-Cola being the most famous – can be used. Other may develop certification schemes to show that those people supplying the good have followed a particular practice, eg organic production methods or artisanal methods.

For other groups of producers, producing a product in a particular way or region as designated name, linked to the region and method of production, provides a marketing tools that allows them to capitalise on their uniqueness. These geographical indications are of considerable importance in food, eg Roquefort cheese, Parma ham but as yet are not covered in the WTO. Such designation normally come

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<sup>37</sup> Dutfield G. Biotechnology, Patents and the Life Science Industry. Proceedings of Conference on sustainable agriculture in the new millennium – the impact of biotechnology on developing countries. Brussels, 28-31 May, 2000, forthcoming

out of a well-established activity that has national recognition and produces products sought after by consumers

This issues are well explored by Downes et al along with 5 case studies of what are essentially potentially niche products (kava, Rooibos tea, quinoa, Basmati Rice, and neem)<sup>38</sup>. I agree with their conclusions that:

Both geographical indications and trademarks show the greatest potential where traditional small-scale production is still present, on the supply side, and where end-use products are marketed directly to consumers. In other words, they are less likely to be appropriate when the product is a commodity traded primarily in bulk. Most promising are commodities where at least part of the market is significantly segmented. Markets for specialty food, beverage, and medicinal products are among those where consumer taste and preference has great impact. In recognition of this potential, certification schemes relating to organic, environmental or social responsibility criteria have been developed for bananas, coffee, cocoa, and other products.<sup>39</sup>

## **2. Niche markets, or TK sustainable farming systems**

Within the current approaches it seems likely that some, limited range of TK-based farming systems may be developed and used to serve particular market segments in the overall global food system, for those consumers, at home and abroad, who wish to fulfill their concerns by buying into the values and production systems run by TK-based communities, following the fair trade or organics type approach. With the Fair Trade mark, for example, a trading organisation founded by several development NGOs establishes links with specific communities which receive a greater return for their produce than available through normal channels. The products are then marketed with a fair trade mark in the developed countries as has been pioneered by the Max Havelaar Foundation. These products tend to be bought by that niche of consumers concerned about development issues. The product does have to be able to stand up on its own, however, as a good product as it is competing for shelf space and must sell enough for it to be worthwhile retailers stocking it.

A growing consumer concern in the developed countries, which face a basic problem of overproduction in food, is an interest in the processes by which their food comes to them. By and large, commodity producers only want consumers to focus on the product itself, not the hidden attributes of its production system that lies behind the product itself. In this there is support in the current global trade rules which prevent discrimination on the basis of production processes, and regard a product as a product as a product, regardless of how it is produced. However, this concern is certainly something that would provide a basis on which TK-systems could capitalise and should be developed. Current developments in traceability, for example in Sweden, in allowing not just supermarkets but shoppers to be able to see back to where their food products come from might be extended from domestic food safety concerns to make links with communities elsewhere in the world.

## **3. New alliances, networks of support**

These fair trade and other schemes to serve niche markets, however, seem unlikely to ensure the survival and enhancement of all TK-based systems. For this, they need to be an accepted and nurtured part of a broader national development strategy, not simply niche suppliers in a global market. In so far as the

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<sup>38</sup> This paper should be read alongside the Downes and Laird paper, *op cit*, for a detailed discussion of GI and TMs

<sup>39</sup> Downes and Laird, *Innovative Mechanisms etc op cit*

continuation of TK-based production systems and their further development poses a threat to the expansion and dominance of the dominant agriculture development paradigm, those promoting this will seek to eliminate that threat – whether consciously or not. It is in a sense a major competitor for the societal support that is available for the food system and that currently goes through a complex of producer and consumer subsidies to underpin the current capital intensive, high input type of farming, which has little or no place for marginal producers.

There may, however, be different alliances available to support development in this area. Retailers, who have become significant influencers of what products are produced and how and are quite sensitive to consumer concerns, could develop alliances and direct relations with TK based production, in the same way that they have taken an interest in organic farming. At present it seems there are a growing number of possibilities for alliances between TK communities and both NGOs involved in fair trade, environment and development and retailers seeking new products to fill different niches on their shelves. It is an area with considerable potential for growth which could benefit TK communities provided it does not lead to dependence on a single outlet.

This approach is looking at food fitting into international markets which is not the best basis for national food and livelihood security for TK-based systems. Nationally, policy makers have to decide upon the kind of food system they want, and the roles of different sectors and production methods within it.

## **H. Conclusion and Recommendations**

Without some fundamental policy changes, trying to use IPRs to protect TK is, I suggest, likely, at best, to allow creation of some niche markets from products arising from TK farming systems. For TK-based systems to be successful, the communities concerned need to have products that fit into the national economy and not simply rely on uncertain export projects. That means developing the TK-based systems and products derived and sold from them as part of a national food system, with culturally and socially rooted tastes, able to hold its own in the growing globalised system. TK communities also need to ensure they are not locked out of the research agenda by patents and IPR strategies of the major companies and countries seeking to be the main players in the food system but that their innovation systems are supported and rewarded. This raises fundamental questions about the current allocation of R&D expenditures and the kind of questions they are trying to address.

In looking to the future of TK-based systems actions in two areas are needed:

1. In national and international policy in agricultural development to put TK-based approaches firmly into the frame, from economic measures to R&D priorities that use publicly funded R&D devoted to participative research with TK-using communities to strengthen their innovative capacity and further develop their farming systems
2. In using, where appropriate, IPRs to support TK-based systems in
  - establishing a place in national markets through use of geographical indications and trademarks for TK-based products with support to communities to do so
  - requiring patent applications to include a declaration of geographical origin and use of indigenous knowledge in them
  - ensuring IPRs are not used to bolster market domination and exclusion from markets for TK-based products

