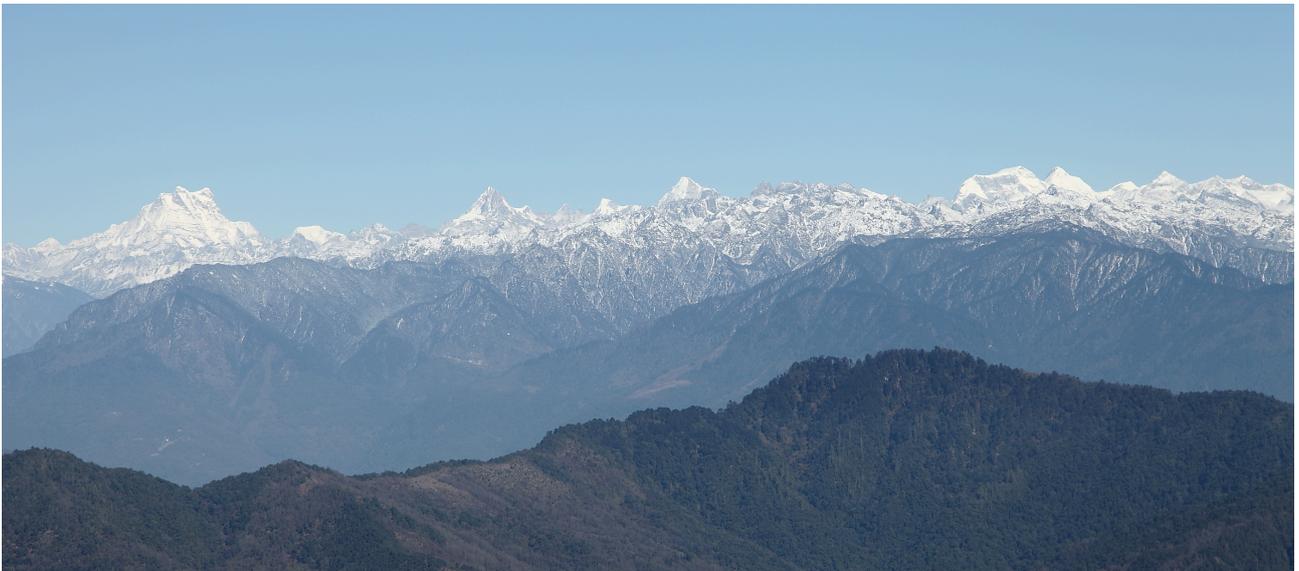


Obstacles to transition

Why is it so difficult to make our food system more sustainable and climate-friendly?

Over the years, a large amount of evidence has been gathered by scientists demonstrating that our food system is unsustainable¹ and that it is a major cause and victim of climate change². The analysis of this evidence also brought many people to envisage the possibility of a food crunch taking place in the future³.

Despite this and notwithstanding a stronger mobilisation of civil society organisations, changes required to make our food system more sustainable and climate-friendly have been taking place only at the margin⁴. Obstacles to change are many and it is essential to explain them and their underlying causes in order to increase chances of overcoming them. This is what this note attempts to do.



“Si haute soit la montagne, on y trouve un sentier.”⁵

For this, obstacles to the transition will be organised here in three main categories:

1. History.
2. Ideology.
3. Structure.

¹ M. Maetz, [Food, Environment and Health](#), 2017.

² M. Maetz, [Climate is changing - Food and Agriculture must too - Towards a “new food and agricultural revolution”](#), 2016.

³ M. Maetz, [The global food crunch: myth or reality?](#) 2018.

⁴ M. Maetz, [Are existing food and agricultural policies supportive to local sustainable food systems?](#) 2015.

⁵ However tall the mountain, there is a path.

1. History

The current situation of our food system is the result of a long history that has seen the way in which humanity feeds itself evolve over time from a period when the majority of humankind was dependent on hunting and gathering food, through an age dominated by traditional family agriculture relying on techniques developed over thousands of years, to now when this traditional agriculture coexists with a type of agriculture that relies on the use of synthetic chemical inputs and operates at a much larger scale. This last system, which is generally labelled as “industrial”, developed over the last 100 to 150 years, is still growing in importance worldwide. Such a long evolution, slow at first and then accelerated has created an inertia to change that is generally expressed through the concept of “**path dependence**”⁶.

Interlinkages

In the case of food and agriculture, a key aspect of path dependence are the strong linkages that were established between agriculture and industry, whether mechanical, chemical or food processing, on the one hand, and between agriculture and the public works and construction sector, on the other.

Chemical industry. The origin of links of agriculture with the chemical industry can be traced back to the time when Justus Liebig (1803-1873) came up with the idea of using mineral fertilizers on crops after he had found that the ashes of plants he had burnt contained nitrogen, phosphorus and potassium. At that time, the chemical industry was developing in a world where agriculture was, by far, dominating the economy (for example, agriculture represented then two-thirds of the economy of countries like France); it was therefore quite normal that the nascent industry would seek to sell its products to agriculture⁷. In fact, it was only after Fritz Haber (1868-1934) had invented the fossil energy-demanding process by which atmospheric nitrogen could be fixed, that the production of synthetic nitrogen fertiliser began.

At first, this production was very limited but it boomed after World War II when the question arose of how existing factories producing explosive for the war could be converted to more relevant uses in times of peace. The answer was rather easy given that the production of explosives and synthetic nitrogen fertiliser used the same precursors. Factories were therefore reoriented toward the manufacture of chemical fertiliser and the promotion of its use in agriculture was made in a world where many countries (particularly in Europe) suffered from a post-war food-deficit situation.

As a consequence, the use of synthetic chemical fertiliser became a normal practice for European and North American farmers. Later on, through the promotion of the Green Revolution, synthetic fertiliser use also became a normal practice for a large number of farmers in the South, particularly in Asia. At the same time, agrochemical companies

⁶ “Path dependence” refers to the fact that a choice to be made at a certain point in time will be at least in part determined by earlier decisions or past events even though the conditions in which they occurred may not be relevant any more. The resulting decision will then not be optimal. This idea is often related with the notion of inertia or the fact that “history matters”.

⁷ Besides agriculture, industrial development also dwelled on a strong association with the military, giving birth to the military-industrial complex. The consequence of this partnership has been an industrialisation of war that saw its destructive and deadly nature amplified in an extraordinary way from the 19th century onwards.

diversified their produce and offered farmers an increasing choice of synthetic substances that could be used as pesticide, fungicide or herbicide. The demand for these chemicals rose as farmers moved to monoculture and saw their crops become more susceptible to pests and diseases.

Mechanical industry. A similar evolution took place with the development of the industry that proposed machinery and equipments to the agricultural sector, the development and use of which allowed to free a part of the rural labour force from agriculture and move it towards developing industrial and urban centres.

Food processing industry. With increased industrialisation and urbanisation, the need to process food first in order to preserve it better, facilitate transport and later save time spent by people at their home to prepare food led to the development of the food processing industry.

Public works and construction companies participated in this evolution by being actively involved in the huge investments that led to the development of irrigation, to the construction of feeder roads, of ports and in the building of agricultural and food-related facilities (e.g. sheds, silos, coldstores, greenhouses, factories, etc.).

Investment

The historical evolution briefly described above went along a tremendous growth of investments in food production, processing and distribution. Investments carry the advantage of generally contributing to an increase of productivity of labour, and in the case of agriculture of land (e.g. the development of irrigation that has represented a large share of public investment since World War II⁸). They also have the characteristic of requiring time for producing their results and become profitable; therefore, they lock-in those who make them in a type of production that cannot easily be changed or abandoned, even if it turns out that it was a bad idea.

The world is full of investments that have not generated expected profits but remain in operation, their owners investing further into them with the hope of improving them and ultimately gaining from their efforts. This creates **rigidity** in the system: a farmer that has invested in a cocoa plantation will not clear it to replace it by other trees or crops if prices of cocoa are low; a farmer who is indebted because he invested in huge industrialised poultry farm cannot decide easily to stop this type of poultry farming, for example to move to a free-range organic poultry system in which his expensive buildings will become useless. Banks will oblige him to continue until his debt is reimbursed, even if it means he will earn less than if he were to change technology.

International trade⁹

Another characteristic of the path followed by the food system has been the increased reliance on **trade** which has been a source of additional links - this time international - that brought stronger cohesion to the system, more stability and capacity to resist to change. International trade developed in an extraordinary manner after World War II, the flow of

⁸ M. Maetz, [Water and Hunger - The “all-out irrigation” strategy has led to a fragile, wasteful and inequalitarian system](#), 2013.

⁹ M. Maetz, [International trade in agricultural commodities](#), 2014.

total goods being multiplied by 300 between 1948 and 2013¹⁰, while the volume of internationally traded agricultural commodity increased 40 times between 1961 and 2011, as a result of measures of trade liberalisation (multilateral and bilateral free trade agreements, in particular).

Over this period, new giant agricultural trading countries emerged, such as Brazil, Argentina, Thailand and Indonesia. This changed radically not only the structure of consumption throughout the world, and particularly in rich countries, but also the way food is produced. Multinational companies mushroomed and it is the development of trade that made that livestock production worldwide increasingly relies now on massive imports of feed from abroad (e.g. soybean, cassava, maize), and it encouraged the development of gigantic production units.

Cheap food

One of the underlying reasons for the emergence of the current dominant industrial food system is probably the persistent will of governments to secure cheap food to the population. Cheap food is required to keep salaries low in order to preserve the competitiveness of industries and political stability. Experience shows that when food prices go up faster than salaries and other incomes, there is a risk for civil disturbances: history is full of examples of food riots that led to change of government and even revolutions, the latest being perhaps recent events in Sudan.



The use of synthetic fertiliser and pesticides, of improved seed and of irrigation are part of the efforts to keep food prices low. So is free trade that removes border taxes and opens up a country to low-cost food imports. The result of a cheap food policy has been on the

¹⁰ M. Maetz, [Borders in the global economy - Control of labour, mobility of goods and capital, preservation of profits and exacerbation of inequalities](#), 2018.

one hand a reduced weight of food in household budgets over the last decades¹¹ and, on the other hand, a neglect of hidden costs of producing food, in particular costs incurred in terms of natural resources degradation, deterioration of the environment, climate change, increased reliance on fossil fuels, loss of biodiversity, social costs born by farmers¹² and other workers, as well as health impacts on producers and consumers¹³. Much of the cheap food policy is based on the displacement of the costs of producing food towards the future and the environment, and on a low remuneration of the agricultural labour force.

2. Ideology

General ideological context

After a period that goes from the 1930s crisis to the 1980s, during which the State was the major player in the economy, there was a major U-turn in the ideological base on which food policies - among other policies - were designed. The new dominating ideological orientation was based on the vision of an open, private sector-led economy where the role of the State was reduced to a minimum and where deregulation was to “free private initiative”. In the food sector, the development of trade and the supremacy of the free market were expected to boost productivity, production and profits.

With a weakening State and stronger private companies, private and personal interests became more important than the general interest of the public. In line with the neoclassical liberal economic theory, profit - quick or immediate profit - became the main if not unique basis on which to decide what kind of activity should be undertaken, while people became freer to act in their personal benefit in an individualistic way, success being measured in terms of money and material possessions accumulated.

With time, attempts were made to value in monetary terms typically non-monetary matters such as natural resources and other items that, for obvious reasons, could not be any more neglected in a purely economic approach to decision making that was by then compelled to take into account some major non-economic elements. Built-in the dominant method of economic analysis, discounting translated “presentism” into “scientific” terms, by giving systematically less weight to future benefits and costs and, consequently minimising in decision-making the importance of long term consequences of actions undertaken. This way of thinking obviously carried - and still carries now - enormous risks of taking decisions that will damage the future.

Today, with a growing awareness of long term issues such as climate change, natural resources degradation and food quality and safety issues, “presentism” and “economicism” appears dangerous ideological attitudes and many realise that there is a need to change the way we apprehend the world around us. Also, an increasing number of people feel the need to regulate activities of big economic players and believe that only the State as an

¹¹ In France for example, “since 1960, households spend on food a decreasing share of their consumption expenditure: 20% in 2014 compared to 35% in 1960”, [Cinquante ans de consommation alimentaire : une croissance modérée, mais de profonds changements](#), INSEE, 2015 - In the US, the share allocated to food is much lower than the level observed in France; in poor countries, the share is much larger and can be higher than 60% for the poorer population groups.

¹² M. Maetz, [Low agricultural prices, debt, farmer suicides, strikes and ban of purchases of cattle for slaughter: India's agricultural crisis](#), 2017.

¹³ M. Maetz, [Production and use of pesticides: an infringement on the rights to food and health](#), 2017.

expression of political preferences of the majority of the population (whether local, national, regional or global) can perform this essential task.

But, locked-in in decades of ideological thinking, analysing and measuring, it has become extremely difficult to think out-of-the-box, and those who succeed in doing it are often considered either as naive dreamers or as dangerous and reckless activists.

Staging of the food issue

Another aspect of the ideological predicament in which we stand, is the way the food issue is generally staged and the narratives used for this purpose: it is described in a way to suggest that this problem is characterised first and foremost by the absolute need to produce ever more food and in a more technically efficient way.

By claiming that we need to produce more, the risk is high that the amount produced is given more importance than the quality of what needs to be produced and the way it is produced. This kind of statement hides three major issues: is what is needed to ensure future food security of humanity only a matter of producing larger amounts of food? Or could securing future food security also involve changing the composition of what we eat (and therefore produce) and how we eat it? Does the way we produce it have any impact on sustainability? Does who produces food in the future matter?

In the dominant way of staging the food issue, important elements of a solution to the food problem are quietly eliminated from the discussion, for example the need for:

- Changing our way of consuming food to make our diet more efficient (in particular by reducing the share of animal products, knowing that around half of the grain produced worldwide serves to feed animals) would help reduce the volume of food to be produced and consequently the pressure exerted on natural resources;
- Combatting food waste would further help reduce the amount of food to be produced and the pressure exerted on resources;
- Adopting more sustainable production technologies that preserve natural resources; and,
- Helping the hundreds of millions of small farmers who produce most of our food and among whom the majority of the undernourished people are found, in order to improve their lives, which is also an obvious part of the solution¹⁴.

Those who say that production should become more efficient technically, encourage the tendency to find solutions that are more sophisticated from a technical point of view, requiring more inputs, more investment, more buildings¹⁵, and that would above all reinforce the interlinkages that we have already analysed earlier in this article. They also discard small family farmers from the solution, as they generally consider them as « backward » and unable to take up new technologies. They see these farmers as a constraint, as people who use inefficiently land and water resources, and they believe that these resources should be in the hands of those whom they erroneously present as being more efficient actors (e.g. large industrial plantations and farms)¹⁶.

¹⁴ M. Maetz, [Can the food issue be reduced to a question of production?](#) 2019.

¹⁵ See for example: Fresco, L., [Local and organic is a romantic myth – the future of sustainable agriculture is all about smart technology and scaling up](#), Aeon, 2015.

¹⁶ M. Maetz, [Are industrial megafarms the solution for feeding the world?](#) 2018.

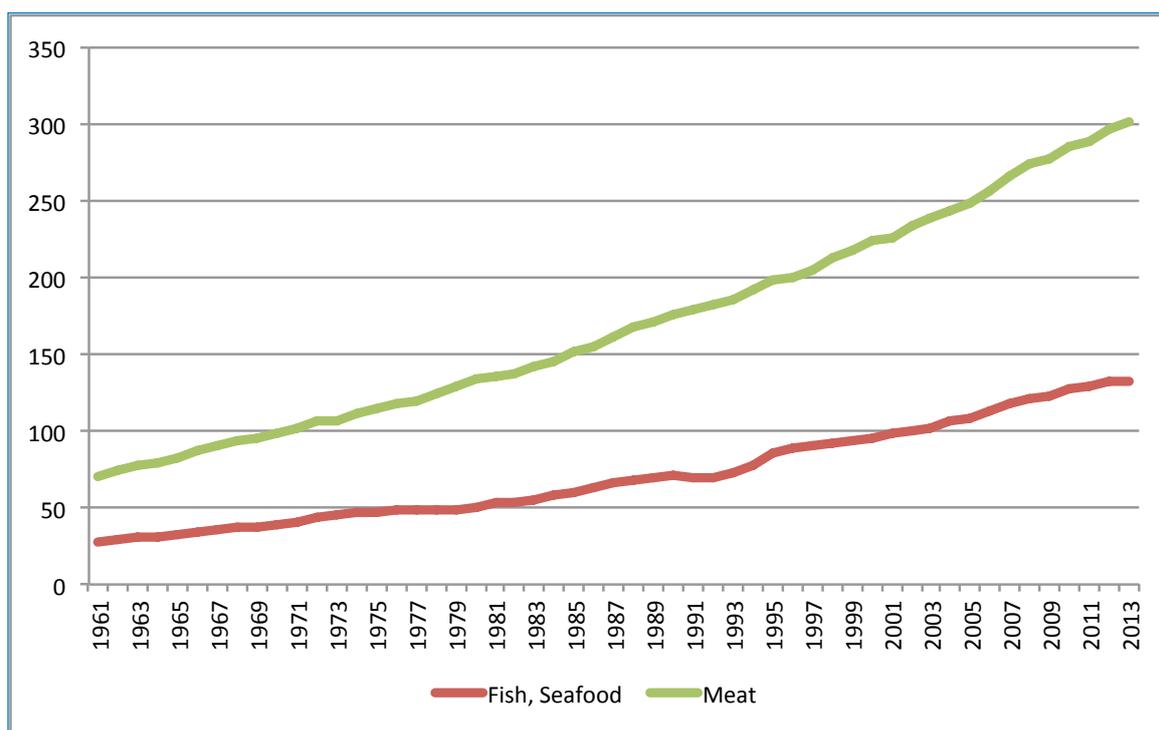
3. Structure

Food habits

The changes described earlier deeply transformed the way people eat. We have become used to cheap and highly diversified food. To have an idea of how different things are now, just bother to ask elderly people what and how they were eating five or six decades ago and compare with today. Cold chains, hypermarkets with myriads of cheap products - including exotic and off-season food -, ultra-processed food and food robots have become common and have changed radically the way food is being consumed. These habits - which are largely the result of very effective, aggressive and ubiquitous advertising - have now become entrenched. They appear normal, if not indispensable and will be extremely difficult to change rapidly on a large scale.

The major aspects of the evolution observed included a fantastic increase of meat, fish and seafood consumption worldwide, a growing share in diet of processed food¹⁷ and the development of a taste for exotic and off-season food. **Figure 1** shows that in a little more than 50 years, the global supply of meat was multiplied by more than 4, while the supply of fish and seafood grew almost 5-fold to meet an increasing demand.

Figure 1: Evolution of food supply of meat and fish&seafood between 1961 and 2013



Source: [FAOSTAT](#).

Little by little, over decades, this change has been accompanied by the elaboration of a large set of rules and regulations that are adapted to industrial mass production and can

¹⁷ Read for example: M. Maetz, [US Food and Agriculture: present and \(perhaps\) future situation](#), 2017 and M. Maetz, [The impact of the 2007-2008 food security crisis: the uncounted social and economic cost of resilience](#), 2016.

only be respected with difficulty by small production or marketing units and associations of community-supported agriculture, thus hampering their development¹⁸.

It is complicated to change habits, particularly when they are intertwined with lifestyle as is the case with food habits (status, growing individualism, working hours, screen addiction, etc.). For the majority of people, spending more money or time for preparing food is not an option, thus making it difficult to evolve towards more sustainable diets where fresh food - possibly originating from organic agriculture - would gain in importance.

There are however some signs of change that are going in the direction of a more sustainable and climate friendly food system. Consumption of meat has started to reduce in rich countries or among the economic elite of poor and emerging countries; community-supported agriculture has been growing despite constraints hampering its development; consumption of organic or fair trade food products is on the increase, even if it remains still rather marginal and limited to better-off sections of the population. So there is some hope there and an indication that inertia in the face of transition can be overcome¹⁹.

Political balance of power

Multiple and powerful stakeholders with specific interests. As a result of the creation of the linkages reviewed earlier, huge multinational companies (Bayer, Syngenta, etc.) emerged upstream to provide their agricultural inputs²⁰, while downstream the food processing industry and retail business grew to supply food to rapidly growing cities, attracting large financial investments leading to the creation of huge conglomerates²¹. More recently, finance has gained a greater importance in the food system²² thus further integrating it in the overall economy.

The establishment of a dense web of linkages and the multiplication of important stakeholders with strong interests thus created a more solid system capable of resistance against any change that would be a threat to the interests of some of these operators. This evolution was facilitated by prevailing economic conditions that were characterised by cheap energy, a better organised and better paid labour force (particularly in rich countries), agricultural research geared towards large production units, government subsidies and the progressive concentration of the retail system²³. At first, the system was heavily dominated by the fast developing processing industry; later, large scale retail companies managed to gain a dominant position. It is likely that in the near future, emerging “Big Data” operators will become the new bosses of our food system²⁴.

¹⁸ M.Maetz, [op.cit.](#), 2015.

¹⁹ M. Maetz, [Our food system: some reasons for hope...](#) 2017.

²⁰ M, Maetz, [The large multinational corporations in charge of our agri-food system...: upstream corporations](#), 2014.

²¹ M. Maetz, [Large manoeuvres in the global food system: concentration and financialisation consolidate its industrial nature](#), 2017.

²² Jomo Kwame Sundaram and Anis Chowdhury, [World Bank Financializing Development](#), 2019.

²³ International Panel of Experts on Sustainable Food Systems (IPES-Food), [From uniformity to diversity. A paradigm shift from industrial agriculture to diversified agroecological systems](#), 2016.

²⁴ M. Maetz, [Is « Big Data » remodeling our food system?](#) 2018.

All these changes have contributed to marginalise traditional agriculture and have led to the progressive abandonment of earlier ways of cultivation that had their advantages (for example, monoculture progressively replaced crop associations) casting them in everything but oblivion, and they encouraged an acceleration of the artificialisation of conditions under which food production is taking place.

Compartmentalisation

The extraordinary development of knowledge during the 18th and 19th century has led to a compartmentalisation of science. Universalism becoming the exception if not an impossibility, specialisation encouraged a fragmentation of knowledge as scientists focused on particular disciplines. This evolution led to a progressive separation of knowledge. Later specialisation occurred even within disciplines, an emblematic example of this trend being medicine where nowadays, there are less and less generalists and a greater number of specialists.

This evolution deeply affected our way of considering reality and its issues: rather than addressing it in a holistic way, the dominant way of thinking has been to break down issues into smaller elements in order to try and solve individually each piece of the puzzle thus created. Today, we realise that this way of thinking has considerable drawbacks as it does not permit to comprehend a problem in all its dimensions and complexity. Issues like the environment or the climate are immensely complex and can only be addressed properly with a systems approach that factors into our thinking the multiplicity of links and feedbacks existing between the diverse elements that make the world around us. Progress has occurred in that direction in recent decades, but much more is needed.

A consequence of this compartmentalisation can be found in the way our institutions are structured vertically. In the field of agriculture, it is often the case that there are several departments dealing with various aspects of the sector, and research and extension have often been organised by product (e.g. rice, wheat, maize, cocoa, coffee, etc.), largely because of the priority given to specialisation and monocropping and the central role given to the concept of value chain. Education in agriculture has largely followed the same pattern. Only limited efforts have been made in terms of farming systems, crop associations or ecosystems research, although in recent times, some worthwhile initiatives have been taken.

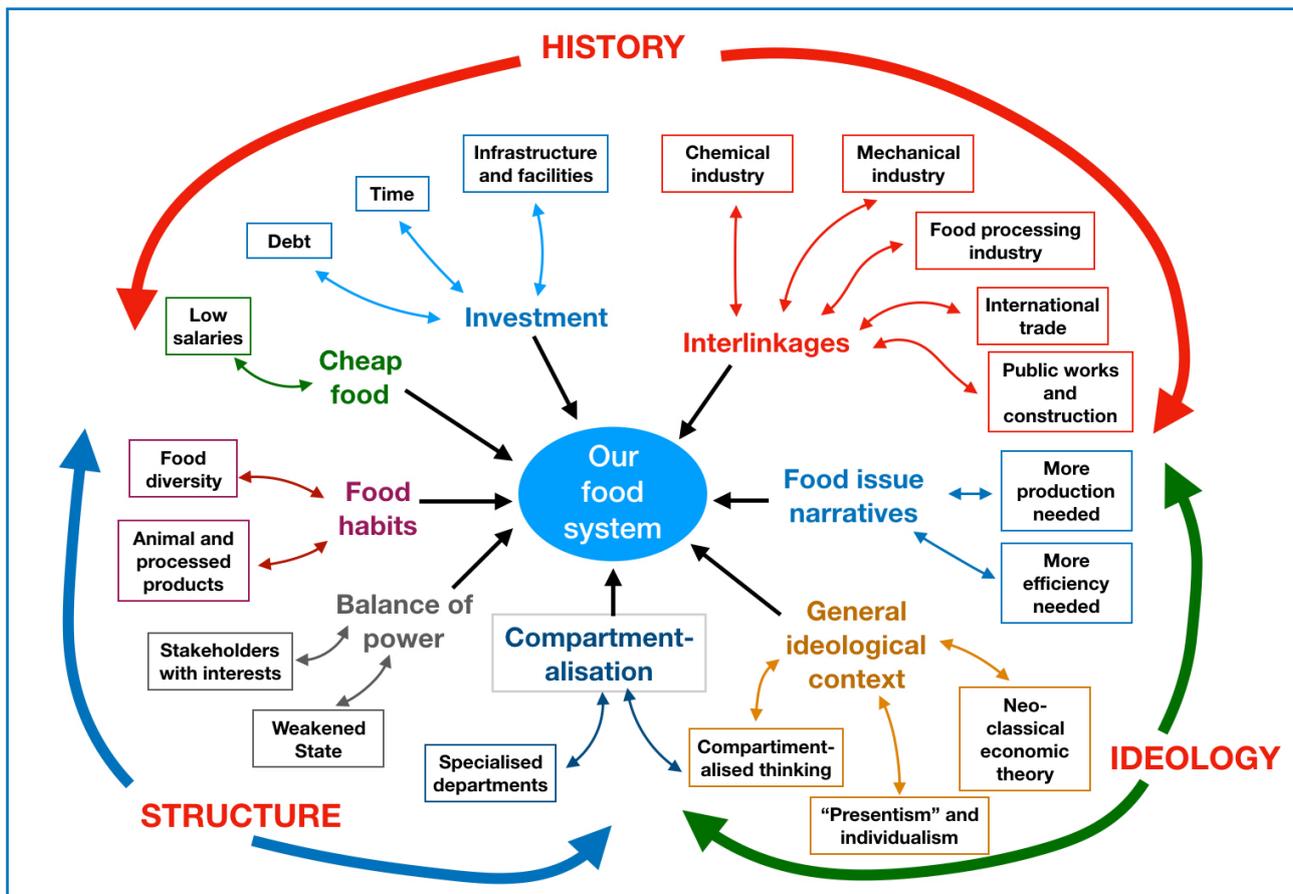
Compartmentalisation of government have made coordination quite very difficult to achieve; the same goes for the economy where value chains are organised around one commodity and operate without considering what happens with others. This has led to disjointed commodity based policies that are unable to cater for sectoral or global issues that are beyond their scope.

Transition, which requires to consider the food system as a whole, will need more multidisciplinary work and more development of new and more effective tools to analyse complexity.

4. Implications

Figure 2 summarises the main obstacles to a transition towards a more sustainable and climate-friendly food system.

Figure 2: Obstacles to a transition towards a more sustainable and climate-friendly food system



One could easily argue on the distribution of these obstacles across the three categories of history, ideology and structure. For example, in the diagram, some of the obstacles under “history” clearly are of a structural nature. Similarly, elements found under “structure” and “ideology” are evidently the result of an evolution that took place over time and therefore are the product of history. So there are some shortcomings and arbitrariness in this the logical grouping of obstacles. This weakness is a fine example of our tendency to separate and classify in categories elements that are intimately interlinked and our difficulty to think in terms of systems.

The imperfection of presentation may not be that important provided we are fully aware of the very deeply entrenched nature of the obstacles reviewed here: they are firmly set in our thinking, our way of considering the world around us, in our behaviour and in the manner in which we are organised.

The implication is that transition will require us to perform very profound changes, some kind of cultural revolution. Resistance to change will not only come from people defending their interests, it will also be due to individuals refusing to challenge the way they have built themselves since they were born, influenced by all the stimuli surrounding them, in particular publicity. A fundamental revolution of mentalities and behaviours is what is required and it is likely that this will take time to occur and that it will be in some way rather painful and in many ways extremely exciting.

Time is precisely the most precious resource and it is available only in a very limited amount as we need to act rapidly. Pain is something we have learned to hate and seek to avoid. Excitement is a positive emotion: we must hope that the excitement of taking up this amazing challenge will help us overcome all obstacles.

[Materne Maetz](#)
September 2019

To know more :

- The Economics of Ecosystems and Biodiversity (TEEB), [Measuring what matters in agriculture and food systems: a synthesis of the results and recommendations of TEEB for Agriculture and Food's Scientific and Economic Foundations report](#), UN Environment, Geneva, 2018.
- IPES-Food, [From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems](#). International Panel of Experts on Sustainable Food systems, 2016.

Selected articles linked with this article published earlier on [hungerexplained.org](#):

- [Policies for a transition towards more sustainable and climate friendly food systems](#), 2018.
- [Food, Environment and Health](#), 2014, rev.2017.
- [Climate is changing - Food and Agriculture must too - Towards a "new food and agricultural revolution"](#), 2016.
- [Are existing food and agricultural policies supportive to local sustainable food systems?](#) 2015.
- [Intergenerational equity is possible, provided there is a fundamental change in the principles that govern the world](#), 2015.
- [Seven principles for ending hunger sustainably](#), 2013.

And many other articles under our category "[Sustainable food and agriculture](#)".