

# **Technology Development and Market Access: From a Food Sovereignty Perspective**

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# **Technology Development and Market Access: From a Food Sovereignty Perspective**

**Wilhelmina Quaye**

## **Thesis**

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## LIST OF ABBREVIATIONS

ADB	Agricultural Development Bank
AgSSIP	Agricultural Services sub-Sector Investment Program (AgSSIP)
CGIAR	Consultative Group on International Agricultural Research
CPG	Cowpea Production Guide
CSIR	Council for Scientific and Industrial Research
CRI	Crops Research Institute
CRS	Catholic Relief Services
CPG	Cowpea Production Guide
DA	District Assembly
DIC	District Implementation Committee
FAO	Food and Agriculture Organization
FCDP	Food Crops Development Project and
FRI	Food Research Institute
FONG	Farmers Organization Network in Ghana
GOG	Government of Ghana
GSFP	Ghana School Feeding Program
HGSF	Home grown school feeding
HFIAS	Household Food Insecurity Access Scale
HFA	Household Food Availability
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICOUR	The Irrigation Company of Upper Region
IMC	Inter-Ministerial Committee on School Feeding
IFAD	International Fund for Agricultural Development
IFDC	International Centre for Soil Fertility and Agricultural Development
IITA	International Institute for Tropical Agriculture
MAFP	Months of Adequate Food Provisioning
MDAs	Collaborating Ministries and Ministry Departments and Agencies
MDGs	Millennium Development Goals
MLGRDE	Ministry of Local Government and Rural Development & Environment
MoFEP	Ministry of Finance and Economic Planning
MoFA	Ministry of Food and Agriculture
MoESS	Ministry of Education, Science and Sport
MoWCA	Ministry of Women's and Children's Affairs
MoH	Ministry of Health
MT	Metric Tonnes
MVP	Millennium Village
NARP	National Agricultural Research Project
NEPAD	New Partnership for African Development
NS	National Secretariat
NVRC	National Varietal Release Committee

ORCC	Office of the Regional Coordinating Council
PGRI	Plant Genetic Resources Institute
PPB	Participatory Plant Breeding
PSC	Programme Steering Committee
RCO	Regional Coordination Office
RSGs	Relevant Social Groups
SARI	Savanna Agricultural Research Institute
SEND	Social Enterprise Development
SPSS	Statistical Package for Social Sciences
SIC	School Implementation Committee
SIGN	School feeding Initiative Ghana Netherlands
TNCs	Transnational Corporations
TNS	TechnoServe-Ghana
UNCTD	United Nations Conference on Trade and Development
UNICEF	United Nations Children's Fund
WIAD	Women in Agricultural Development
WTO	World Trade Organization
WFP	World Food Programme
WVI	World Vision International

# CHAPTER ONE

## Introduction: Technologies, markets and food sovereignty

### 1.1 Introduction

This thesis looks at possibilities and opportunities for the development of technologies and market access for local food products. As such, it aims to understand the performance of local food networks against the background of the idea of food sovereignty. The research focuses on crops and food products in Ghana, mainly cowpea, and the networks producing these crops, processing them into food products and marketing these products. The research has been carried out within the context of an interdisciplinary research programme – Tailoring Food Sciences and Technology to Endogenous Patterns of Local Food Supply for Future Nutrition (TELFUN) – which consists of plant breeders, food technologists, nutritionists and social scientists from Benin/Ghana, Ecuador and India, with initial funding from the Interdisciplinary Research and Education Fund (INREF) of Wageningen University. The central theme of TELFUN is that of enhancing food sovereignty through strengthening local food networks. This contribution to the multidisciplinary research programme focuses on two main socio-technical domains:

I. A technology study comprised of i) an analysis of the social relevance of cowpea production, processing, consumption and variety choice among relevant social groups, ii) an assessment of cowpea diversity on the Ghanaian market and its implications for breeding, and iii) the social organisation of past cowpea breeding activities in Ghana and possibilities for re-constructing this to enhance market access for smallholder farmers.

II. A market access study focusing on i) social relations in the organisation of the Ghana School Feeding Programme (GSFP), and ii) ways to facilitate small-scale farmers' access to this market by involving different groups in the supply of local foods.

Within these two socio-technical domains, two key concepts are used. Firstly, I use the concept of *code*, referring to the social assumptions incorporated in technologies and marketing mechanisms. Although it has become common in science and technology (S&T) studies to apply the concept of codes in order to unravel the power relations in technology design (Winner 1993, Feenberg 1999, 2005, Ruivenkamp 2005), this has rarely been used in the context of marketing studies and still less in combination with technology developments. Applying the concept of codes for an understanding of the power relations in technology and marketing developments, this thesis also indicates *opportunities for rewriting* the codes with the aim of *tailoring technologies* to local needs and using marketing relations to *reconnect* local food production and consumption.

The second concept I refer to is that of *relevant social groups*, emphasising that both technology design (e.g. cowpea variety development) and accessibility to local markets are structured around the inclusion of certain (relevant) social groups and exclusion of others. This thesis shows not only that the functioning of technology and markets is strongly related to the social groups that are involved (de-masking the assumed societal neutrality of technology and markets), but emphasises, moreover, that the societal functioning of production and trade may be altered by *re-opening the domains of technology and markets to other social groups*, – and that this opening process may become crucial for the enhancement of food sovereignty in Ghana.

The two basic concepts of codes and relevant social groups are used in three main ways. First, I use the idea of relevant social groups (RSGs) in the contextual analysis of the local cowpea network and the interpretative meanings of cowpea variety selection among RSGs at the production and market levels. Second, I use the ideas of codes and RSGs to analyse socio-political relations in cowpea variety development in Ghana; that is, how cowpea variety designs have been constructed and the possibilities to re-construct cowpea varieties for enhanced domestic market access by smallholder farmers from a food sovereignty perspective. Third, I apply the idea of codes in analysing the GSFP procurement models and power relations, and the possibilities of endogenizing the GSFP structure to become a better reconnector of local food production to consumption for enhanced food sovereignty.

In this introductory chapter, I start by presenting the scientific position of this research in the discourse of S&T studies, followed by a description of the societal context from which the marketing study has been evolved, that is, the scientific and sociological debate on food sovereignty. This chapter then goes on to present the theoretical and conceptual framework, the research problem, research questions and the methodology of data collection. It concludes with an outline of the structure of the thesis and highlighting of the core contents of the different chapters.

## **1.2 The technology debate**

In the literature of S&T studies, four different conceptions of technology can be distinguished (Ruivenkamp, Jongerden & Lemmens 2012 forthcoming). First, there is the *instrumental or anthropocentric understanding of technology*, in which man as sovereign entity is conceived as the centre of origin of technology development (the anthropocentric aspect) and as an instance independent from – and sometimes also opposed to – technology, which he uses as means for furthering his well-being (the instrumental aspect). This approach is based on a dichotomous model of man and technology in which one is independent of the other and where technology can be deployed for the benefit as well as to the detriment of man and society. This paradigm is that of the ‘splitters’ (Ruivenkamp 1997, 2005). It still has a dominant position in both scientific and public debate and has often been used as the theoretical basis from which new technology projects are designed. The basic assumption of this approach – which is most characteristic of so-called ‘technology assessment’ – is that an evaluation of the social utility of a technological innovation (perceived as a neutral instrument for mankind) can be made by balancing the pros and cons or costs and benefits of

the innovation in question, focusing on the expected utility of the particular technology in terms of goals such as sustainability in the sense of Planet, People, Profit themes (Franke *et al* 2011). Following from the dichotomous model of this instrumentalist conception, a second understanding of technology emphasises the way in which technology has advanced to the stage of developing according to its own dynamics, that there is (now) an inescapable evolution of technology which provides the logic of its own progress: technology is like a moving train following its own track (and which can no longer be stopped or controlled). In this vision of *technology as a force with an intrinsic dynamic*, the inherent dynamic (the techno-evolution) is primarily conceived of as the specific way in which man relates to nature as a stock of raw materials and energy; as a resource, that is, which we can instrumentally unlock and exploit (Heidegger, 1977). It is this relation to nature that represents the essence of technology and reproduces the dynamic development of technology. The grounding of this in an instrumental logic, however, is often not appreciated and therefore also often neglected, which contributes to a further spreading of that logic (Lemmens 2008, citing Heidegger). In short, it is this instrumental rationality of technology that needs to be problematized, particularly whenever this instrumental logic is presented as something natural or inevitable.

A third understanding of technology is thus based on the *intrinsic interrelation of man and technology* and reflects on the ways in which man's subjectivity and freedom are constituted by technology. In this vision man is not perceived as a sovereign entity located at the centre of technology development and dichotomously opposed to (separated from) technology. On the contrary, it is precisely the interwovenness of man and technology that forms the starting point of this approach – which has therefore been termed the 'weavers' approach (Ruivenkamp 1997, 2005). The interaction of man with technology is here considered as the core dynamic determining the human condition and driving the evolution of mankind. This approach emphasises the ways in which freedom and autonomy – traditionally understood as being independent from technology – are in fact constituted in and through the interaction of man and technology. This view perceives technology as constitutive of and conditional for human autonomy and the realisation of freedom, and examines whether and how technology developments play a constructive or destructive role in extending that autonomy and freedom. According to this 'weavers' approach, the scientific and public debate should no longer be focused on evaluating the various potential advantages or disadvantages of an instrumentally conceived technology, but rather on developing strategies to enhance the constructive role of technologies. This approach will be further elaborated in this thesis.

Following and additional to this discourse, a fourth understanding of technology can be discerned which is sometimes designated as the *critical reconstructive* approach. The core characteristic of this approach is an emphasis on (the possibility of) a reconstruction of technology and can be designated as the paradigm of the 'redesigners' (Ruivenkamp 1997, 2005). Like the interrelational 'weavers' approach, this regards technology as a condition for (enabling) human freedom and autonomy, but it goes a step further in emphasising that technology developments always occur within power structures. Critical reconstructivism specifically points to the fact that some interest groups and actors may have more influence

than others on technological developments, with the likely effect of negatively affecting the freedom and autonomy of less influential and/or powerful actors.

In this vision, technology as a decisive factor in shaping the human condition is historically and socially located and contextualized within its current historical context of asymmetrical social (power) relations. It is recognised, for example, that the opportunities for public intervention in technology design have been reduced in the modern age in favour of a steadily proliferating expertocracy and technocracy. Also, it is stressed that existing social inequalities are frequently incorporated in the very design of technologies, or in other words that there is a political ‘bias’ which manifests itself in the *socio-technical code* of technologies (Feenberg, 1999). In short, the design of technologies always involves political choices and these choices are part of technology itself. Therefore, one can speak of a politics inherent or incorporated in technologies (‘politics in technologies’), implying the recognition that technologies are intrinsically political: they reproduce power relations through ‘politicising products’ (Ruivenkamp 1989, 2005). The critical constructive approach perceives technology explicitly as a ‘politicising agent’, both shaped by social relations *and* shaping them.

One significant characteristic of this critical reconstructivism is that social aspects of technology are perceived in a quite different way. This approach no longer focuses on the impacts (consequences) of a technology on society (as if technology is external to that society, the splitters’ assumption), but on how (asymmetrical) social relationships are incorporated in technology (the critical asset), and particularly whether and how these social relations and assumptions encoded in technology can be *changed* (the reconstructivist aspect). Here, the so-called ‘impact’ of technology is seen as a feature of technology itself: since social aspects are perceived as constituent parts of the formation process of technologies, this is not an inevitable process importantly divorced from human endeavour but becomes a domain of social struggle. The critical reconstructive approach brings technology back into society. And besides contesting the incorporation of unequal social relations in technologies, it also emphasises that other specific choices can be made (values introduced) in order to reconstruct the development of technology and relate it to processes of democratization of power relations. In short, the critical-reconstructive approach focuses on the *rewriting* of the ‘socio-technical code’ in technology, a core concept of this thesis.

### *The code in the technology*

An important starting point for reflection on the concept of codes is Langdon Winner’s (1987) ‘Do artefacts have politics?’ In this article, Winner refers to the urban architect Robert Moses and his early twentieth century design of a connection between New York’s Long Island and the barrier islands to its south, a location known for its beautiful beaches. Winner focuses attention on the fact that the roads leading to the bridge were constructed with overpasses, which effectively meant that cars driven by the well-off (which, at the time, equalled white Americans) could pass and reach the beaches, whereas buses transporting the poor (mainly black Americans) could not. The moral of the story is that in the design of an artefact – here an overpass, but the same applies to a building, a fermentation tank, a cowpea variety – a specific social interest (a code) is present which may result in the inclusion of

specific groups (the rich white) and exclusion of others (the poor black). The code concept emphasises that technical artefacts materialize power relations that *through* the design of an artefact a specific politics can be instantiated (Ruivenkamp 2005).

This idea of codes alerts us to the fact that technology development is not neutral or natural but takes place in a social context which ‘inscribes’ its politics as a social-technical code in the design of a technical object and in particular the unequal social relations present in that context. Moreover, the code concept indicates that technologies are developed within a cultural horizon (Feenberg 1999), within general socio-cultural assumptions from which a technology is developed and from which ‘the politics in technologies’ is practiced. Hence, a re-codification of a technology begins with unravelling its political content within the current trajectory of technology development and highlighting opportunities for rewriting the code.

According to Feenberg (1999: 86), it is a difficult task to rewrite a code in a technology because this implies the tracing of often hidden social or cultural assumptions that are incorporated in the technology. Feenberg mentions the example of the textile mills in 19th century England, where the machines in the factories were ‘naturally’ attuned to child labour. This specific design of the textile machinery was only questioned (and changed) when the social assumptions about the correctness of child labour were challenged and a social struggle successfully conducted for the abolition of child labour (whereupon textile machinery was redesigned to be operated by adult workers). Nowadays, suggests Pieter Lemmens (2008), the instrumental, anthropocentric conception of technology is currently so self-evident that it is hardly questioned, which undermines efforts aimed at rewriting its codes.

Referring to Winner’s code concept, Latour (1988, 1999) emphasises that bridges, chairs and the like do indeed ‘contain’ politics, or, as he puts it, ‘morality’, and that in our daily contact with artefacts we are forced to carry out specific actions that we would not do otherwise. But he also stresses that these artefacts also contain a promise (potential), that they may be used in different environments for other purposes and/or that in the course of time these artefacts may acquire other functions (with different politicized meanings). These days, for example, Moses’ overpasses do not so much hamper the poor as the prosperous yuppies wanting access with their campers to the Long Island beaches. One implication of this is that artefacts not only reflect current power relations (in that case, were they merely to reflect, they would themselves be politically neutral, which is exactly what Winner disputes), but also offer opportunities for an alternative ‘(sub)politics’ (Ruivenkamp 2005).

It is not hard to find ‘positive’ examples in which normative values have been incorporated into the design of artefacts. From the history of textile machinery one may come up to date with protective appliances like tractor cabins, social goods such as the speed bump that forces motorists to drive slower, or etiquette as in the case of automatic doors, where the normative injunction to ‘close the door behind you’ is included in the design of the door. These examples make it clear that through a specific design, normative behaviour can be purposefully implemented through – ‘designed into’ – the artefacts, and that, therefore, an alternative design politics can be conducted through this.

This movement towards a purposive design of artefacts to promote that which is valued – represents an insight that has gradually led to a shift from the concept of code towards that of *script* (Latour, Procee) or *recodification* (Ruivenkamp 2005, Feenberg 2010), terms that point not only to an unravelling of the politics embedded in artefacts but also to an elaboration on the opportunities to rewrite them, in particular for the purposes of incorporating other (different) social meanings, and alternative normative and political-economic frames of references in the design of artefacts.

In this thesis, some possibilities for rewriting codes in cowpea variety design during cowpea breeding development are discussed. However, a focus on rewriting the codes in technical artefacts – such as cowpea crops – needs to have a social carrying capacity through the involvement of RSGs and, at least for practical purposes (given the contemporary structure of trade), must be enrolled in marketing relations. Marketing relations, in turn, carry a political (and highly politicized) code, one that has been strongly challenged through the food sovereignty debate.

### **1.3 The food sovereignty debate**

The Via Campesina umbrella movement of organisations of farm workers, peasants and indigenous peoples from all over the world is known for its challenge to the (governing) patterns/codes in market relations, which it has made an object of dispute and renegotiation. Particularly criticised is the (neo-)liberalization of trade in food, which, according to the movement, affirms and extends the monopolistic control of agro-business over food production and consumption, and reinforces the spread of hunger and poverty in developing countries. Emphasising the need for change to currently prevalent food policies and market relations, the movement introduced the concept of ‘food sovereignty’ at the World Food Summit held in Rome in 1996. It was formulated at that time as follows:

Food Sovereignty is the right of peoples to define their own food and agriculture; to protect and regulate domestic agricultural production and trade in order to achieve sustainable development objectives; to determine the extent to which they want to be self-reliant; to restrict the dumping of products in their markets; and to provide local fisheries-based communities the priority in managing the use of and the rights to aquatic resources. Food Sovereignty does not negate trade, but rather it promotes the formulation of trade policies and practices that serve the rights of peoples to food and to safe, healthy and ecologically sustainable production. (Pimbert 2008: 3)

This much cited declaration by La Via Campesina draws attention to many issues, such as the effects of free trade and the commoditisation of food. However, it is more than a declaration proposing to do things differently, more than a proposal for an alternative policy framework: it refers to the enactment of the principles of food sovereignty here and now, it is a call to action.

The Via Campesina peasant/social movement can be framed in terms of a ‘resistance of the third kind’ (Van der Ploeg 2007, cited by Jongerden 2012, forthcoming). This is a kind of resistance to the dominant ordering principles present in trade relations, technologies and in



many other domains and policy contexts; it is a resistance that challenges the codes in these domains and (re)claims the right to intervene in today's standard practices, to alter the processes of food production, consumption and trade and to strengthen a wide range of heterogeneous practices. The efforts of La Via Campesina directed towards implementing these heterogeneous practices are inspired by the following seven principles (Desmarias 2009):

1. **Reorganising food trade.** Food is first and foremost a source of nutrition and only secondarily an item of trade. National agricultural policies should prioritise production for domestic consumption and food self-sufficiency; food imports should neither displace local production nor depress local prices.
2. **Democratic control.** Smallholder farmers should have direct input into formulating agricultural policies at all levels. The movement emphasises that the United Nations and related organisations will have to undergo a process of democratization to enable the realisation of this.
3. **Food: A basic human right.** Everyone should have access to safe, nutritious and culturally appropriate food in sufficient quantity and quality to sustain a healthy life with full human dignity. The movement advocates that each nation should declare access to food as a constitutional right and guarantee the development of the primary sector to ensure the concrete realisation of this.
4. **Agrarian reform.** A genuine agrarian reform is necessary which gives landless and farming people – especially women – ownership and control of the land they work and returns territories to indigenous peoples. The right to land must be free of discrimination on the basis of gender, religion, race, social class or ideology; the land belongs to those who work on it.
5. **Protecting natural resources.** Food sovereignty entails the ongoing care for and sustainable use of natural resources, especially land, water and seeds and livestock breeds. The people who work the land should have the right to practice sustainable management of natural resources and to conserve biodiversity free of restrictive intellectual property rights. This can only be done from a sound economic basis with security of tenure. Healthy soils and reduced use of agro-chemicals are prioritized.
6. **Social peace.** Everyone has the right to be free from violence. Food must not be used as a weapon. Increasing levels of poverty and marginalization of the countryside, along with the growing oppression of ethnic minorities and indigenous populations, aggravate situations of injustice and hopelessness; the ongoing displacement, forced urbanization, oppression of and increasing incidence of racism directed at smallholder farmers cannot be tolerated.
7. **Ending the globalisation of hunger.** Food sovereignty is undermined by multilateral institutions and by speculative capital. The growing control of multinational corporations over agricultural policies has been facilitated by the economic policies of organisations such as the World Trade Organisation (WTO), World Bank and the International Monetary Fund (IMF), and liberal policies toward regulation and taxation of speculative capital. A strictly enforced Code of Conduct for Multinational corporations is required.

In its efforts to resist and transform these aspects of global food systems, the movement has itself also evolved. According to Martinez-Torres and Rosset (2010), five evolutionary stages can be discerned through which the movement has increasingly organised itself on a transnational basis:

Phase 1 relates to the *emergence* of Via Campesina during the 1980s and early 1990s out of autonomous organisations of peasants, indigenous peoples and ecologists, first in Latin America and then on a global scale, and leading to a transnational social movement seen as defending the forgotten, the peasants and indigenous peoples ignored by the imperative of ‘development’.

Phase 2 saw the movement established in *international debate* between 1992 and 1999, when its leaders were able to put forward their arguments for social change on the international stage.

Phase 3 confirmed the important role of social movement and enabled La Via Campesina to take a *leadership role* in global struggles during 2000-2003.

Phase 4 (2004-2008), in which the movement focused on itself, engaging in *internal strengthening* of the organisations of peasants, indigenous peoples and ecologists.

Phase 5, from late 2008 to date, has had the peasant/social movement broadening its scope of activities to *practical opposition* to transnational corporations, disputing with food policy makers and emphasising the convergence of multiple dimensional crises (financial, climate, energy and food), which are seen as also opening new spaces to challenge the dominant food model.

Various authors, such as Desmarais (2007), Borras (2008), Rosset (2008) and Borras and Franco (2009), have described the ways through which ‘the voices of peasants’ have been heard, leading to a plurality of collective, anti-hegemonic struggles on various fronts of action challenging trade relations and the social organisation of food production and consumption as well as leading to initiatives at national level to incorporate the food sovereignty principles in national legislation and national agricultural policies in countries like Venezuela (1999), Senegal (2004), Mali (2006) and Nicaragua (2009). For example, Ecuador (2008) developed a food sovereignty framework law,<sup>1</sup> while Nepal (2007) and Bolivia (2009) have integrated the right to food sovereignty in their interim constitutions (see also Beuchelt & Virchow 2012).

Despite the strong evolution of the peasant/social movement and even its embedment in national constitutions, the index for hunger in the world remains at a serious level, the global food situation is becoming more alarming and still many millions of peasants remain unable to claim their rights in respect of food. The struggles of the peasants to resist the distorted patterns in trade relations, the disconnections of industrialized agriculture from local parameters and the commoditization and change of the food quality of agricultural products are exemplary of their fight to strengthen localized food systems and inscribe other

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<sup>1</sup> One of my colleagues in the TELFUN programme, Alessandra Martinez, has analyzed the food sovereignty framework law in Ecuador for her PhD thesis on food sovereignty there.

patterns/codes in trade relations and production systems. This represents a response to a litany of threats to but also new perspectives for localized food systems.

*Threats to localized food systems: Trade relations and misconceptions*

Throughout the world, movements of peasants, indigenous peoples, ecologists, producers and consumers are seeking to realise a diversity of autonomous food systems, based on equity, social justice and ecological sustainability (Desmarais 2002, Windfuhr 2005, Desmarais 2007, Pimbert 2006, Borras 2008, McAfee 2008, McMichael 2008, Roling 2008, Rosset, 2008, Borras and Franco 2009, Rosset 2011). The food sovereignty notion recognises that a) there are still many diverse local food systems throughout the world today, particularly in developing countries; and b) most the of the world's food is grown, collected and harvested by the 2.5 billion plus small-scale farmers, pastoralists, forest dwellers and artisan fisherfolk. This food is primarily sold, processed, resold and consumed locally, with more people again deriving their incomes and livelihoods through work and activities at different points along the food chain, from seed to plate. Worldwide, these localized food systems provide the foundations of peoples' nutrition, incomes, economies and culture. They start at the household level and expand to neighbourhood, municipal and regional levels. Despite their current role in and future potential for meeting human needs and sustaining diverse ecologies, locally determined food systems are still largely ignored, neglected or actively undermined by governments, corporations and academic paradigms on development. Peasant/social movements are engaged in a continuous struggle within this co-existence of social relations encoded either in global food chains or in localized food systems, through which they aim to transform the patterns (codes) in a range of areas, such as in trade relations.

One important threat to the localized food systems comes from the *patterns in international trade relations* and the various governmental measures (trade liberalization policies) which create worsening effects on the localized food systems by integrating smallholder or peasant farmers into unfair competitive trade relations. For example, the EU has insisted that African countries open their markets to imports of products like rice, tomatoes and poultry. This measure to liberate trade negatively affected local rice farmers in Ghana leading to the current situation whereby about 75% of rice consumption is constituted by imports (Quaye 2007, Quaye et al. 2010a). Another example is the Central American Free Trade Agreements with liberalizing markets, which resulted in increased imports of basic foods – maize, beans, rice and sorghum – and a steady decline in per capita land area producing these foods (Boyer 2010). Kunneman (2009) has described similar crowding-out effects of trade liberalisation due to cheap imports in Africa, focusing on the plight of local milk and maize farmers in Uganda, milk and honey farmers in Zambia, and tomato and poultry farmers in Ghana. Beuchelt and Virchow (2012), Feldman and Biggs (2012), IAASTD (2009), Bello (2008), Murphy (2008), Boyer (2010) and Rosset (2006) have all looked at the flooding of the domestic markets in agro-based developing countries with cheap, subsidised agricultural imports from industrialised countries and the devastating effects this has on local production systems. It is obvious that peasants cannot be expected to compete with global corporate food systems in international food trade due to power imbalances in capacities, economies of scale, access and availability of resources (IAASTD 2009), which explains the emphasis that

La Via Campesina places on transforming the patterns in international trade relations and on which this thesis also focuses.

A second threat to localized food systems are the *misconceptions about peasant farming and resulting developmental policies*. According to Naranjo (2011) the following four misconceptions about peasant farming can be discerned: (i) peasant farming systems are of low productivity and economically inefficient, (ii) peasants are unable to feed themselves, (iii) peasant farming cannot feed the world's ever-growing population, and (iv) peasant farming leads to environmental degradation. In contrast to this one-sided and negative estimation of peasant economies and their potential for growth – leading to developmental policies of industrialization, modernizing the so-called traditional farming systems – Naranjo (2011) emphasises various mediating factors. On one hand there are mediating factors that may contribute to a marginalization of peasant economies, such as (i) the low level of productive resources peasants have or can access, (ii) the limited possibilities for peasants to earn income, and (iii) the peasants' limited access to both domestic markets and fair international trade, while, on the other hand, there are mediating factors that may enhance the perspectives of peasant economies related to the peasants' autonomy, such as (iv) their control of productive resources, and (v) allocation of their own labour time to their own agriculture. Indeed, other authors (Patel 2006, Jongerden 2008, Van der Ploeg 2008) emphasise the peasants' resistance to their marginalization – as illustrated by La Via Campesina – fighting not only against the unfair trade relations but also for reviving their localized food systems. Instead of accepting the '*dead peasantry*' hypothesis expressed in modernization theory and some Marxist approaches, according to which the peasantry as a class has disappeared, or inevitably will, Van der Ploeg (2008) emphasises the possibility for the emergence of new peasants who co-exist with the 'food empires' and actually out-perform them in terms of gross production (see also Long, 2001, 2008, Wiskerke & Ploeg 2004, Weis 2007, Jongerden 2008).

#### *Perspectives for localized food systems: post-modern peasants and reconnections*

Van der Ploeg is inspired by three lines of reasoning. First, the post-modern peasants are *struggling for autonomy*, to progress in the context of dependency, exploitation and marginalization created by the 'empires' (Hardt & Negri 2000). Second, the post-modern peasants are *playing a critical role in modern society* and influencing the quality of life and of food, and promoting sustainable production and consumption, especially in the current agrarian crisis. Today's peasants have strong interrelations with society and the environment through the *care* they invest in landscape, biodiversity and food quality: they are an integral part of the present and the future. Third, the 'empires' with their dominant mode of ordering tend to marginalize and destroy the peasantry. Thus, there is a *continuous co-existence of peasant and empire arrangements* through which peasant movements like Via Campesina fight for those arrangements in food production, consumption and trade that give them new *perspectives* for installing their localized food systems. An important strategy to overcome the threat to localized food systems made by empire arrangements is the effort of peasant/social movements to *go beyond the disconnection* of agriculture from its local

parameters, as has become constitutive of the industrialization of food production, and to fight to *regain control* of local eco-systems, knowledge, skills and cultural repertoires.

Various authors (Altieri 1990, Van der Ploeg 1992, Pretty 1995, Long 2001, 2007, Van der Ploeg 2004, Ruivenkamp 2005, Kareiva et al. 2007, Altieri 2009, Wittman 2009) have emphasised the disruptive effects of the patterns of disconnections embedded in the industrialization of agriculture and food production. Wittman, for example, demonstrates the de-linking of agriculture (society) from nature as a result of agribusiness and corporate food production systems and the destructive effect of these on the socio-cultural and ecological values of peasant farming systems. However, with the re-emergence of peasant farming systems and agrarian citizenship, she also refers to the potentiality of *reconnecting society and nature* and reminds of the need for society and nature to shape and reshape each other.

Analysing biotechnological developments in global food chains, Ruivenkamp (1989, 2005) argues that current biotechnological developments are shaped by and in turn reinforce three historical processes of disconnections or separations of industrialized agriculture in global food chains: 1) the separation of agriculture from its ecological environment, (2) the separation of agriculture from food, and (3) the separation of agricultural products from their intrinsic nutritional quality. Also – and importantly in the context of this thesis – Ruivenkamp emphasises that new technologies are not necessarily related to the socially dominant interest groups of global food chains and inevitably cast in the role of handmaiden to these three separation processes. It is also possible to use technologies precisely to *reunite what has been separated in global food chains and recreate and strengthen local food systems and peasant economies* (Ruivenkamp 2007:57). Ruivenkamp refers to the possibilities of using technologies for a re-coupling of agriculture to its natural environment, restoring the relationship between food production and agricultural production and re-linking the agricultural product with its food quality.

Other authors (Sonnino & Marsden 2006, Appadurai 2008, Levidow 2008, Manzini 2008) have also emphasised the relevance of re-linking agricultural product to food quality. They dispute the food quality implications of industrialized agriculture embedded in global food chains and propose alternative food networks that *reconnect production-consumption* through a sustainable and quality processes and products with distinctive taste or freshness. Recurrent food scares and health-related implications of industrialized foods for the global market have also become a source of worry to many consumers. Dixon (2009) draws attention to the increasingly contested nature of the ‘search for nutritional and diet-based ontology security’ in a world of shrinking dietary diversity and natural resources. Other examples are the introduction of additives like trans-fatty acids and sugar syrups in industrialized foodstuffs. Analysing how Italian consumers are increasingly disconnected from their locally produced, healthy foods, Nicolosi (2006) views process sociologically in terms of the production of ‘orthorexic society’.

Contributing to the dispute on food quality, Patel (2008) refers to the *illusion of choice*. Consumers’ belief that they have a choice in deciding what to bring to their dining tables is illusory because, among other reasons, they lack adequate knowledge about how their foods

are produced. Patel refers to the iniquity of '*being stuffed or starving*'. On one hand, peoples are 'stuffed' with the products of the food multinationals (to wit, the massive rise in obesity), while on the other hand, peasants in developing countries suffer not only from the lack of choice – as a result of excessive power wielded by corporate food systems – but also from the unfair competition with farmers in developed economies (who are further advantaged by continued subsidies).

The threats to and perspectives for localized food systems are the sites of contestation in many domains, which may be termed 'frontier areas for the struggle of peasants'. This is not only a struggle to *resist the disconnections* in agriculture from local parameters and the specific patterns in trade relations leading to unfair competition and high external market dependency. It also concerns a *fight for changes and reconnections* through, as Harcourt (2008:439) emphasises, changing our taste, eating locally and seasonally, and supporting sustainable agriculture and locally owned businesses and rural policies, based on living wages for all. And in the fight for the realisation of localized food systems through establishing reconnections in agriculture and changing food quality characteristics, access to and control over productive resources are crucial issues.

#### *Access to and control over production resources: land and seeds*

In challenging the threat to localized food systems, the effort of peasant/social movements to gain access to and autonomy (control) over production resources is focused on areas such as land, seed, water and technology, as well as access to credit (Young & Mittal 2008, IPC 2008). Here, I introduce issues related to land and seeds.

Agrarian reforms forthcoming from the struggles for (access to) land have been a key issue in the move for food sovereignty, with, for example, the peasant movements heavily criticising land reforms led by the World Bank as privatising land and transforming it from a collective right or ownership into a tradable commodity where money rather than locality or labour is the key to access. According to Rosset et al. (2006), the World Bank's land policies have worsened the situation of peasants in many participating countries (like Brazil, Thailand and Mexico) because of their market-based approaches with land grabbing for export-led farming and the production of bio-fuels (Rosset 2011, Rosset 2006, Torres 2011).

In respect of the bio-fuel drive, a specific crop (sugar, for ethanol) becomes linked to the land access issue. Another specific, crop-based example here from South America is the massive cultivation of soybeans, which has involved a great increase of deforestation in the central Brazilian state of Mato Grosso. Not only has this environmental destruction damaged the indigenous settlements, but the soybean industry has also consolidated the inequality in land distribution (in 2002, there were five million landless families in Brazil, with 150,000 camped on the roadside).

Discussing the ethical relations underlying production systems in South Asia (India and Bangladesh), Mazhar et al. (2007) have emphasised the relevance of localized rather than globalized food production and consumption systems, particularly for job creation. Indeed, in many places of the world there is an intensive struggle going on for public support for or

opposition to the various forms and techniques of land redistribution, which may assist either global food chains or smallholders and communities.

As well as land, peasant movements are also struggling to get access to and control over the development of seeds as another important productive resource. Different perceptions exist among various RSGs on this productive resource. The peasant movements believe that seed is a common heritage of humanity, held in trust by rural communities and therefore should not be treated as a tradable commodity (Altieri 2009, Haugen 2009, McMichael 2009, Koohafkan & Altieri 2011, Ayres and Bosia 2011, Kumbamu 2012). La Via Campesina considers seed as a key production resource, indeed, as the foundation for food sovereignty, and vehemently opposes reliance on seed companies when seed can be produced locally. Kloppenburg (1988) showed that with the development of hybrid maize seeds, for example, farmers are encouraged to buy new seeds for planting every year instead of using their own seed from the previous harvest. Hybrid seeds like this strengthen farmers' ties to multinational corporation in production systems, and while increasing yields also tend to increase ill affordable risks (when resource-poor farmers see their expensive seed investments lost in times of failed crops).

Ruivenkamp (1989, 2005) looks at how the breeding of new cultivars and the maintenance and propagation of basic seeds originally performed by farmers has increasingly been taken over by public research institutions and multinationals, and how this change in the social organisation of breeding activities has also affected the characteristic of the product. The seed has become a tradable and patented commodity with Trade Related Intellectual Property Rights (TRIPS) effectively giving monopolistic power to private enterprise and increasing the dependency of farmers on the firms that own the genetic materials and commercial seeds. Indeed, a single company, Monsanto, owns close to 90% of genetically engineered seed in commercial use worldwide (Murphy 2008).

The development of seeds that strengthen the monopolistic power of seed supply companies and create dependency relations of farmers to these companies led Ruivenkamp (1989, 2005) to classify these commercial (and often genetically engineered) seeds as 'politicizing products', in which social relations of monopolistic power and farmer dependency are encoded (inscribed) in the products (as described, above).

Parayil (2003) confirms that new forms of crops and plants are developed not just to help alleviate poverty and reduce hunger through productivity improvement, but also to increase the economic power of transnational companies which invest heavily in R&D. The pertinent question here that emerges from this debate is whether and in which ways it will become possible to *re-codify seeds*, to change the politicizing code in the seeds and particularly in ways that may enable the peasants to become a more integral part of the present and future food production system (Van der Ploeg, 2008).

In view of this scientific and social debate on the role of seeds – here, cowpea in Ghana –for strengthening the sovereignty of local food systems, it is necessary to investigate and unravel the power relations that are 'encoded' in the development of new varieties and market

relations as well as to explore existing practices in order to consider potential possibilities for peasant movements to rewrite the codes (to re-codify), attuning them to the practices of their local food systems and enhancing the access of their food products to domestic markets. Both strands of this research – *unravelling* power relations and *re-codifying* technology and market relations – are based upon a theoretical position that is based on an elaboration of critical constructivist concepts.

#### **1.4 Theoretical positioning of the research**

This research investigates the technology development and market access of local food products in Ghana against a background of ideas on food sovereignty. In so doing, it elaborates a critical constructivist understanding of technology development and market access by investigating the concepts of code and RSGs in the domains of technology and the market. The technical functionality and the social applicability of artefacts are interwoven and thus not easily separated without critical analysis. According to Feenberg (2010), a ‘*technical code*’ links the social and technical functionality in the design of an artefact by describing the congruence of a social demand to a technical specification; and among the various options for connecting technical options and social applications, the values incorporated in the design of an artefact are mostly biased towards those of the dominant actors. These typically being a powerful minority – the ‘ruling elites’, controllers of ‘capital’ or prestigious researchers – it follows that there is a need to democratize the technical code. In order to be able to democratize and change a *code* –for example, for local peasant groups to influence the design of a new cowpea variety, as investigated here – there must first be an understanding of the processes of *stabilization* and *closure* which occur during the design of the artefact.

##### *Challenging the stabilization and closure of technical codes*

The *stabilization* of the technical code in a design refers to the degree to which an artefact is accepted among the RSGs. These groups can be distinguished based on their shared or diverging social interpretations of the artefact in question. The key requirement is that all members of a particular RSG share the same (social) interpretation of an artefact (Pinch & Bijker 1984, Bijker 1992). The relevancy of a social group is related to its capacity to contribute to the process of stabilization in designs, particularly in terms of the social relevance of the artefact to that specific social group. Any one design of an artefact is only a single point in the large field of technical possibilities, reflecting the interpretations of various social groups; there is not just one possible or even best way of designing an artefact. Indeed, there are as many designs as there are RSGs giving different (but specific) social meanings to an artefact; there are differences in how people comprehend or interpret artefacts and (thus) also in how artefacts are designed and developed. Given the dynamic of changing conditions over time, moreover, this variety might itself change and adapt (the RSGs and their interests are not fixed), and the relative input of the different groups might grow or decline (leading to a flexibility in the design process). This research thus focuses on *variety and flexibility in ascribing social meanings* on the part of RSGs to cowpea varieties developed in Ghana.



The more homogeneous the meanings attributed to a particular artefact, such as a cowpea variety, the higher is the degree of stabilization for a particular artefact within and among RSGs (Bijker, 1993). At the planning stage but also in the construction stage, some RSGs can embed specific social meanings in the material design of artefacts. Thus, stabilization occurs at different points in the design process and among different RSGs as a function of this. An appreciation of the relevancy of specific social groups through the design process is an important aspect in understanding how a technology develops in respect of its content and applicability.

An indicator for stabilization is when the interpretation used for an artefact becomes, over time, more accepted. One may consider an idealized form of scientific development in which there is the emergence of a victory in the competition between alternatives; and one may even speak about *closure*, when groups reach a consensus in relation to the meaning of an artefact or to its problem-solving capacity or when the RSGs agree upon a redefinition of a problem and the function of the artefact in solving that problem. Less ideally, of course, democratic deficit in technical codification (lack of input by interested but disempowered groups, such as peasant farmers) tends to imply a lack of genuine alternatives, and society's unequal power relations enable a forced closure – thus the sense of a 'natural' (techno)evolution or inevitable course of development, as described (above, 1.2).

Closure in the interpretation of a technological artefact manifests itself when there is the endurance over a period of time of a simplified form of standard design value (for example, priority to high yields) which is not (no longer) challenged by relevant groups. Closure is not permanent, however, and *flexibility in the design process* may be reintroduced through changing circumstances and the formation of new social groups introducing new meanings into the design of the technological artefacts. It is possible, therefore, to re-open stable codes, to break through the closure in the social meanings ascribed to an artefact, for example by the development of new insights from groups previously not considered relevant or just not considered. This research investigates whether the *meanings* given to cowpea variety development by certain RSGs *are challenged and renegotiated* by other social groups, how this is realized in the design of the cowpea varieties and what the consequences of this are.

#### *Multi-directional courses of technology development*

Opening up technology development process to a wider range of interest groups and concerns could lead to a better technological outcome or to a redesign of technological artefacts with greater compatibility to their location-specific context. This research investigates whether disclosure and interpretative flexibility can be achieved particularly in relation to the social workability of a designed artefact within its social context(s). An artefact designed on the basis of a specific meaning given by a RSG can be technically workable or efficient in a given context but socially undesirable in another context. Sometimes technical choices may seem to be fair when they are abstracted from context specific values but may become discriminatory when applied in such a location-specific context. Therefore, it is important to understand whether and in which ways a *technically feasible device* – such as high yielding

or early maturing cowpea varieties – can still become *discriminatory* in a location-specific context.

The developmental process of designing an artefact is affected by a range of social, technical and contextual factors, such as the presence of RSGs, the technical functionality and the location-specific circumstances. This implies that different routes are available in technology development which may lead to different technological outcomes. While the traditional deterministic view of technology (still dominant in many domains and generally implicit in the evolutionary view described) emphasises an unilinear course of technology – from less to more advanced configurations of development and the existence of a fixed abstraction, a technological base to which social institutions and localities must adapt – recent S&T studies have stressed the *multi-directional course* of technology development processes. For each artefact there are several social groups ascribing various specific meanings to the artefact, relating also specific problems and different possible solutions for these problems to a differentiated design of the artefact, and with shifting power relationships that include also changing alliances between groups.

To investigate the *opportunities for diversifying the technological routes*, this research refers to Feenberg's (1999, 2005) distinction between aspects of technology that stem from the *functional relation to reality* and the aspects stemming from its *social environment and implementation*. Feenberg thus suggests investigating the incorporation of devices in a technology – built upon the meanings and expectations delivered by relevant social groups – as well as the realisation of the functionality of that technology in particular social environments. As also pointed out by Rosen (1993), it is necessary to look not just at the internal dynamics of the technology, but also to look at the same time to the wider social context in which it is located. The socio-cultural and political background or, simply put, the social contexts of technological development are actually embodied in the content of the technology (Hughes 1986) and by revealing the social-cultural contexts as well as the internal dynamics of a technological development it becomes also possible to start a *process of disclosure and opening possibilities for reconstruction* to better suit that technology to a particular social context in the continuous but fluid process of technology-society interactions. Just as technologies have different meanings to different RSGs, there are always multiple ways of constructing technologies differently in various contexts (Feenberg 1991).

Other concepts that refer to this relationship between context(ualitie)s and RSGs include 'appropriate technologies and tailor-made technologies'. This concept of 'appropriateness' suggests a bottom-up approach to technology development, starting with locally defined needs, embracing all RSGs in priority settings and the evaluation of technical solutions for location-specific problems as perceived by these RSGs (Broerse & Bunders 2000: 275-296, Vroom 2009, Moser & Barret 2003, Brooks 2011). The concept of appropriateness holds the way that technologies are actively appropriated by their users as central to the process of the social (re)construction of technology. The tailor-made technology approach (Jongerden 2008, Ruivenkamp 2008) emphasises that it is not sufficient for user groups to appropriate technology but that attention needs to be paid to changing the development of technical codes by the user groups at a local level, and that only by changing the codes in the technologies

can an alternative politics be enabled. In this research, I contend that the opportunity to reconstruct and improve the social applicability of cowpea varieties (technologies) is embedded in a new material design attuned to the social (local) contexts in which the technologies are applied.

### *Contextuality of the design process*

Alongside an investigation of the existing power relations among various relevant (and non-relevant) social groups in the ascription of specific social meanings to new cowpea varieties, this thesis also looks into the opportunities for *enhancing* the local applicability of cowpea variety development in Ghana by *renegotiating* the social meanings incorporated in cowpea varieties. The contextual applicability of cowpea variety development in Ghana is investigated by studying its embedment in the Tolon-Kumbungu district of Ghana's Northern region. The study shows that there are possibilities and opportunities for improving the social applicability of cowpea varieties by *reorganising the design process* and further *attuning the material design* to its local context.

An important characteristic of the technology (and market study) is the investigation of the extent of *participation* by emerging RSGs in cowpea breeding activities in Ghana and the exploration of opportunities by these for reconstructing the social-technical code of cowpea variety designs. This research investigates possibilities for reversing earlier choices in (ascribing specific meanings to the) cowpea variety development and whether the power asymmetries between different RSGs in the codification of technologies can be challenged by more participatory and location-specific design processes. Referring to the food sovereignty debate, Pimbert (2006) has emphasised the relevancy of a radical shift from the existing top-down and increasingly corporate controlled research system to knowledge systems that entrust greater responsibility and decision-making power to peasants, indigenous people, smallholder farmers, food workers, consumers and citizens.

### *Relating the technology and market studies*

Emphasis in this introduction has been placed on the relationship of technology to society, but as stated (1.1), this thesis includes a market as well as technology study, and with, moreover, the latter incorporating marketing considerations among its primary aspects of the study. The opportunities for enhancing location-orientated design processes for cowpea variety developments are closely related to the opportunities for creating an enhanced accessibility of these new cowpea varieties to domestic markets. As the places where, or the structures through which, goods and services are exchanged, markets contain *patterns (codes)* that connect producers and consumers, directly or indirectly and in straightforward or highly complex ways. They are sites for flows of commodities but are also systems that organise the flows of goods and services from one time-space location to another. Markets thus imply social relations (directly visible or highly anonymous) which govern the patterns in the movements of commodities. Such (governed) patterns (codes) follow regularities, with goods and services flowing in specific ways, according to specific conditions and with specific benefits and costs (Van der Ploeg 2012).

The close relationship between the technology and market-access studies in this thesis comprises not only a critical application of the same key concepts (codes and RSGs) in both study domains, but also the investigation of (different but parallel) processes of disconnections in actual food regimes, namely, the separation of variety breeding from the local context and the separation of peasants and smallholder farmers from their domestic markets (the separation of production and consumption). Both the technology and market studies are carried out against the background of the idea of food sovereignty, aiming to find room of manoeuvre for these social groups which are still neglected in the actual food regimes. In this context also, both studies examine the social and power relations among various actors in gaining access to their domestic markets. In the case of the market study, this is investigated through an exploration of the Ghana School Feeding Programme (GSFP).

The GSFP research was conducted in four districts in different regions of Ghana and explores the power relations between the various social actors in accessing the markets created through GSFP. In this, particular emphasis is placed on the extent of involvement of smallholder farmers in food product delivery, while also investigated is the question of whether and how the power asymmetries between different social groups (traders, smallholder farmers) in their market access are challenged through the emergence of specific *procurement models* in the Ghana School Feeding Programme.

To summarise, this research positions itself in the scientific debate on technology and marketing developments by:

- Examining the *relevancy of social groups* and their problem-solving perceptions incorporated in the construction of technologies (cowpea varieties) and investigating opportunities for those other social groups that have little or no voice in this process but yet are directly affected by it *to renegotiate and change* the cowpea variety development;
- Examining the *power asymmetries* in the social relations among different actors involved in and/or affected by technology and marketing developments;
- Examining the power asymmetries among different actors in *gaining access* to local markets and investigating opportunities for peasants and smallholder farmers to *re-link* local production and consumption through the creation of specific procurement models within the Ghana School Feeding programme
- Examining these domains of technology and marketing against the background of ideas about *food sovereignty*.

### **1.5 Problem statement and research questions**

The technology development and market-access studies comprising this research focus concretely on i) cowpea variety development and ii) smallholder farmer access to domestic markets in the context of the Ghana School Feeding Programme (GSFP). Efforts are made to explore and unravel the power relations in the variety development and domestic market access of RSGs and to search for opportunities for involving those other RSGs that are neglected in the actual (current) codes of cowpea variety breeding and GSFP marketing. This

field of research is investigated from the perspective of food sovereignty, addressing the rights of people in local contexts across various regions of Ghana to define their own food and agriculture. The core research question is:

*What role do technology developments and market practices play in linking local food production and consumption in Ghana?*

The core research question is subdivided into the following four sub-questions which are separately dealt with in Chapters 2 to 5 and in which the concrete research targets are cowpea breeding and Ghana School Feeding Program. Opportunities for integrating the research results in the context of policy-making in Ghana, is also dealt with in the concluding chapter. The four sub-questions are:

1. How are cowpea production, processing and consumption practices *socially organised* in Ghana, and which opportunities can be identified for enhanced food sovereignty?
2. What are the *cowpea preferences of different stakeholders* (traders and consumers) in the Ghanaian domestic markets?
3. How are *cowpea breeding activities* organised in Ghana, and to what extent have cowpea breeding programmes responded to domestic market demands (and can they in the future)?
4. What is the role of Ghana School Feeding Programme (GSFP) in *linking* local food production and consumption for enhanced market access by smallholder farmers, and how might this be strengthened for enhanced food sovereignty?

Concerning the first sub-question on the social organisation of cowpea production, processing and consumption, it will be shown (in Chapter 2) that the cowpea production and processing in the Tolon-Kumbungu district is largely at a *small-scale level* and is deeply *embedded in the local culture* which strongly shapes working practices and gender roles. The local cowpea network, composed of many actors and having strong collaborative ties, leads to a slight increase in the consumption of some specific street food cowpea products like *waakye* and *koose*. In the selected communities of the Northern Region of Ghana, such as in Tibung, Wantigu, Nyamkpala, Gbanlilugu and Kpaligum, a broad spectrum of differences was found in the social meanings ascribed to variety preferences among farmers, processors and consumers, indicating a differentiation in variety preferences primarily as viewed either from the perspective of household food provisioning or from that of market value.

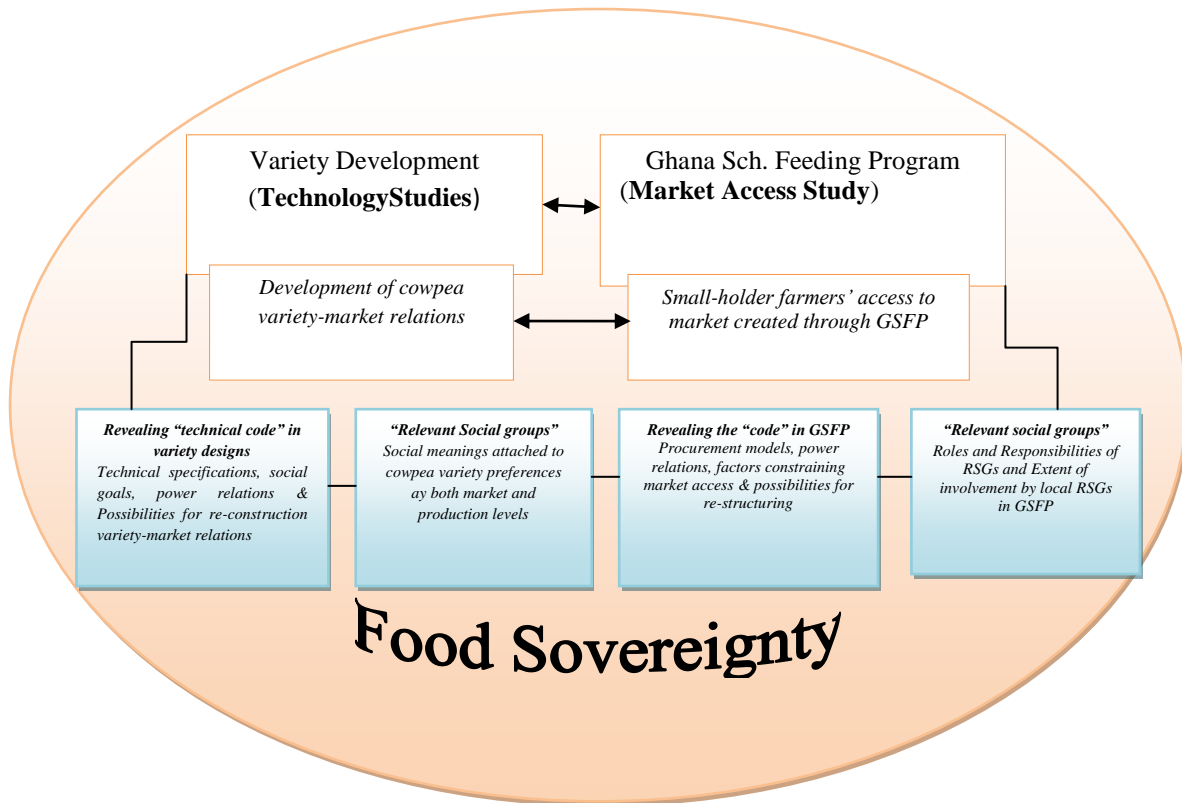
The study on the cowpea preferences (Chapter 3) assesses the emerging consumer preferences for cowpeas as perceived by food traders and consumers. This shows that traders and consumers appear to have similar preferences for cowpea characteristics, such as stone-free and white seeded, with foreign varieties being very popular. Traders, processors and consumers also expressed specific preferences for cowpea variety breeding objectives, which led me to consider them as potential RSGs for involvement in the stages of crop improvement and breeding activities.

The research questions concerning the cowpea breeding activities are discussed in Chapter 4. In reviewing a twenty-year period of breeding, three distinct phases of the breeding process

(upstream breeding, downstream breeding, and validation and variety release) are distinguished, in which different social groups participate and produce different variety designs. It is shown that the composition of the RSGs in the upstream breeding phase is dominated by international research organisations, which de-contextualize the germplasm from the Ghanaian context and develop exotic lines for further development at the downstream breeding phase, leading to a gradual process of reduced interpretative flexibility and then closure in the variety design, now mostly carried out by national research institutions. Nevertheless the upstream breeding and the validation and release phase in which other RSGs appear, indicate that closure in ascribing specific social meanings and objectives in the material design of the varieties is not always permanent, and that through the involvement of other RSGs new meanings and objectives can be inscribed in improved varieties. Particularly relevant were found to be meanings that re-link and re-contextualize improved varieties to location-specific characteristics of the cowpea food networks.

The success of the release, dissemination and cultivation of new cowpea varieties also depends on the access gained by cowpea-based food products to domestic markets. In Chapter 5, the role of the GSFP in linking production and consumption is discussed by investigating the ways in which this programme functions in four districts of Ghana: Manya Krobo (Eastern Region) and Mfantseman (Central Region) in southern Ghana, and Tolon Kumbungu (Northern Region) and Navrongo (Upper East Region) in the north of the country. Different procurement models (supply, catering and school-based model) are presented, which are built upon different social relations and lead to different outcomes in terms of market accessibility. The chapter also shows that the realisation of the GSFP objective of facilitating food production-consumption linkages at local level implies the policy requirement of a clearer description of the roles and responsibilities of the various actors, as described in that chapter. The thesis concludes (Chapter 6) with a presentation of the core conclusions of the technology and market access studies from the perspective of food sovereignty and some concrete policy recommendations.

Figure 1 below shows the interrelations between the various parts of this thesis. The box ‘Technology Study’ refers to the effort to reveal the specific social and cultural meanings (the technical *code*) ascribed in the cowpea variety development by RSGs and the capacity of other (neglected) social groups to renegotiate for the incorporation of their meanings in this process. The box ‘Market Access Study’ refers to investigation of the code in market accessibility through an analysis of the functioning of the GSFP, particularly through the various school food procurement models. Finally, the figure shows that the efforts of the study to find room for manoeuvre to enhance cowpea variety development and market accessibility are stimulated by the *debates on food sovereignty*, which this study aims to apply to the Ghanaian context, focusing on the aspects of cowpea technology and GSFP market access.



**Figure 1.1** Critical social (re)construction of technology and market to enhance food sovereignty

## 1.6 Methodology

This study on cowpea-variety development and domestic market access by smallholder farmers from the perspective of food sovereignty elaborates a critical-constructivist research approach. Characteristic of a critical-constructivist methodology is its explicit relation to *core-concepts of the critical-constructivist theory* and the *gathering of empirical data* through a variety of standard research methods (desk-literature studies, interviews, observation, surveys, etc). Core concepts of the critical constructivist approach as they pertain to this research have been outlined (Sections 1.2, 1.3 and 1.4). Although it may be self-evident, it is nevertheless important to stress that a critical-constructivist social theory is characterised by its critical-constructivist composition, which implies that it constantly confronts existing social relations with their (intrinsic) possibilities for transformation.

The *critical* strand of this approach here focuses on an empirical investigation of the social meanings actually ascribed to cowpea variety development and actual functioning of domestic markets in order to unravel the existing (asymmetric) power relations among social groups in the codification of technology development and market relations. The *constructivist* part of the study consists of an empirical investigation into the opportunities for renegotiating and changing the codes in these by integrating the interests of other, neglected but relevant social groups. In short, the study elaborates two strongly interrelated strands of research methods, those of the critical and the constructive research methodology.

### *Critical-constructive research methodology*

A core aspect of the critical-constructivist research methodology is the tension between the existing, that which is (reality) and that which may be (possibility), i.e. that which can be realised from ‘within the existing is’ (Ruivenkamp 2008: 32). An important characteristic of the critical constructivist approach is that it is principally *critical* in the sense that it is constantly confronting existing social relations and power structures with the inherent possibilities for their transformation in more equitable and democratic ways. In this research, this has been undertaken by confronting existing technology and market relations with (the alternative) ideas on food sovereignty as expressed by peasant/social movements.

This confrontation between the reality of what is and the imagination of what is expressed as desirable by peasant/social movements implies that a critical-constructivist approach does not limit itself to reproducing that what exists but, on the contrary, focuses on showing what may become realised. In this sense it also looks for those actors or RSGs that may give direction for transformation and point the way forward so as to go beyond the actual – and undesired – reality. In this thesis, the peasant/social movements within strengthened localized food systems are considered as such protagonists, or social carriers for the transformation. Referring to their ideas of food sovereignty, the research focuses on acquiring empirical data from and through these marginalized social groups in order to indicate opportunities for integrating their social meanings (codes) into the design of technology and market developments.

Similar confrontations of existing practices and transformative opportunities have been investigated in other areas of technology and market developments. Indeed, the critical-constructivist theoretical approach has stimulated a critical stand against the dominant perception of technology – as value-neutral instrument – and empirical investigation of opportunities for de- and reconstructing technology. Critical constructivist theory also implies a search for social spaces for alternative technology trajectories and to elaborate flexible and multidirectional technology trajectories encoded by location-specific needs. Critical-constructivist methodology tends to operate on the basis of a constant rotation between theory and gathered empirical data in which the theoretical concepts steer the gathering of the empirical data which in turn re-innovates theory. For further elaboration of a critical constructivist theory as focused on the confrontation between what is and what may become, it is crucial to be precise in the gathering of empirical data and application of attuned research methods.

### *Case Selection*

The two social-technical domains have been investigated in an integrated way spread over four cases, and sometimes in collaboration with researchers from other disciplines of the TELFUN research programme. The four research cases involved:

1. *An exploratory, multidisciplinary research of the cowpea network* in different districts of the Northern Region of Ghana, interviewing a representative sample of farmers,



processors, traders and consumers about cowpea production, consumption, poverty levels and development perspectives;

2. *A socio-economic assessment of cowpea diversity and stakeholders preferences at eight domestic markets in two cities (Accra and Kumasi) by questionnaires and group interviews;*
3. *An investigation of the social organisation of cowpea breeding in Ghana through a social scientific literature study, policy reviews, participant observation and interviewing;*
4. *A quantitative and qualitative socio-economic assessment of the role of GSFP in four districts in Ghana through surveys, interviews and participant observations.*

This combination of data collection methods has led to important insights in the actual role of technology and markets in linking production to consumption at local levels and in opportunities for improving these linkages against the setting of food sovereignty as expressed by peasant/social movements. As such, the research illustrates the importance of an interrelation between theoretical concepts, empirical research and further theoretical development. It is important to note that the research has also been driven and informed by the *multi-disciplinary context* of the TELFUN research programme and the *local-specific Ghana/Benin context* in which the research has been carried out.

The TELFUN West African team has focused its research on enhancing food sovereignty by improving existing cowpea varieties and developing cowpea based products for better nutrition together with local producers, processors and consumers. The cowpea network was chosen as the reference crop for this research programme because of its socio-economic and socio-cultural significance in the local production, processing and consumption patterns (Langyintuo et al. 2003, 2004) in West Africa, particularly in Ghana/Benin. The multi-disciplinary setting of TELFUN and the focus on the cowpea network enabled me as social scientist to investigate whether the reconnections of cowpea variety development and cowpea consumption can be strengthened to enhance food sovereignty in Ghana. The research questions were formulated on the basis of extensive literature review leading to the selection of the concepts of codes and RSGs, with a further fine-tuning following on the engagement with the four empirical research projects in a multidisciplinary setting.

The *exploratory, multidisciplinary research of the cowpea network* has been carried out to understand the social relevance of cowpea production, processing and consumption in Ghana/Benin and to formulate a contextual framework from which the variety preferences among RSGs are investigated and endogenous possibilities explored to solve production-consumption de-connections in marginalized areas. To this end, a collaborative, exploratory Coordinated Network Study (CNS) was conducted with a multidisciplinary research team in the Northern Region of Ghana, purposively designed with the broad objective of exchanging cross-cutting ideas and fine-tuning research priorities in the various disciplines.<sup>2</sup> Individual disciplinary questionnaires were designed and shared among team members in order to

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<sup>2</sup> Multidisciplinary research team: plant breeder Kwadwo Adofo, food technologist Yann Madode, nutritionist Abizari Abdul-Razak, and myself as the social scientist.

clarify conflicting ideas and inter-disciplinary issues. The communities studied were selected based on cowpea production and consumption levels, poverty levels and participation in the GSFP.

The *socio-economic assessment of cowpea diversity and stakeholder preferences* was carried out in a similar way, influenced by the need to understand the framed cowpea preferences that are present among RSGs at the local market level. Eight domestic markets (literally, street markets) in two cities (Accra and Kumasi) were selected based on level of cowpea trading activities and patronage by cowpea consumers and processors, who were surveyed by questionnaires and group interviews.

The *investigation of the social organisation of cowpea breeding* was necessitated by the need to understand the mismatch between what cowpea farmers produced in terms of varieties and what the domestic market place demanded. This part of the research has involved an extensive investigation on the ‘technical code’ perspective of cowpea breeding activities over the last 20 years preceding the study period (during 2010). The time frame for cowpea variety development investigation was largely influenced by data availability, and time and resource constraints. The case study illustrates that the development of cowpea varieties does not follow a strict, value-neutral technical logic, but is a social product, patterned by the conditions of its creation and use. Alongside technical considerations – from design to implementation – a range of social factors affect the choices made from among a variety of technological options.

In the case of *socio-economic assessment of the role of the GSFP*, issues were investigated related to an understanding of possibilities for a re-localization of food production and consumption. In particular, the study assessed whether the school feeding programme is enhancing food sovereignty in the households of farmers with access to the demand for foodstuffs by the neighbouring schools that participate in the GSFP. The surveys, interviews and participatory observations were carried out in collaboration with the nutritionist in the TELFUN-West African team in four districts in Ghana, which were selected in view of cowpea production and consumption levels, poverty levels and GSFP participating communities.

#### *Gathering empirical data: Key data collection methods*

A combination of various quantitative and qualitative data collection methods have been used in each of the four projects – the exploratory cowpea network study, cowpea diversity assessment, cowpea breeding study and GSFP assessment – to investigate technology (cowpea variety) development and market access of cowpea-based local food products on schools participating in the GSFP. Further detail regarding the interviews, focus groups and observation is given here.

#### Interviews (open, expert, structured)

In-depth interviews in qualitative research are useful for collecting data on *individuals’ personal experiences and perspectives* about the research areas, particularly when sensitive

topics are being explored. One-on-one interviews can be formal or informal, involving the use of structured questionnaire and/or semi-structured interview guides for individual interviews with appropriate representation of the target population under study. Expert interviews (Meuser & Nagel 2002) – which also involved the use of semi-structured interviews – were conducted here to draw on experiences from experts in specialized fields, especially in variety development and the GSFP (administration). These expert interviews provided unique opportunity to obtain ‘insider’ information about projects (e.g. GSFP), policy formulations and indigenous knowledge concerning cowpea breeding. Experts with whom I interacted in this research included breeders, seed growers, officials of Ministry of Agriculture, GSFP officials and representatives of strategic partners of the GSFP. I also interacted with ‘other experts’, such as indigenous people, including experienced farmers and processors, chiefs, traditional elders and assemblymen who are rich in local knowledge of cowpea breeding, production and consumption practices.

A snowball sampling technique was used to locate key informants for expert interviews and also for identifying RSGs in the cowpea network in respect of production, farming practices, processing, consumption patterns and possibilities for enhancing food sovereignty. In snowball sampling, individuals or organisation mentioned by interviewees (intentionally or otherwise) in their responses are followed up as further (prospective) interviewees. In some situations, especially with government officials, advanced interview appointments and consents for participation in the expert interview schedules were prepared before actual interviews.

### Focus Groups

The purpose of focus group discussions is to gain understanding from and *generate knowledge* about a particular topic or research interest (Krueger, 1994) *among purposively or randomly selected subgroups* of a bigger population. Focus group discussions may be effective in, for example, eliciting data on the cultural norms of a group and generating broad overviews of issues of concern to the (sub)groups represented. In this research, focus group discussion was used for triangulation and consensus building on key issues relating to specific research questions using either a semi-structured interview guide or questionnaire (Krueger 1994, Borgatti 1999; Denzin & Lincoln 2005). The semi-structured questionnaire comprised several open-ended questions allowing respondents to refer to a wide range of options and encouraging them to express their views on the specific issues under discussion. In this research, primary data and information collected through focused group discussions complemented and ensured the quality of data obtained from one-on-one interviews, as detailed in the methodologies of the empirical chapters 2 – 5.

### Observation

The data collection method of observation involves *watching behaviours, practices, events, processes and interactions in their natural settings*. It involves a three-stage process: first, gaining access to a particular study area or community; second, living, interacting and/or working among the people under study in order to grasp their world views and ways of life or

everyday practices; and third, reporting or giving material evidence of what has been observed, such as in the form of field notes, tallies, photographs and drawings (Bernard 1995, Dewalt & Dewalt 1996, Denzin & Lincoln 2000, Russel 2006, Yin 2009). Participant observation – observing as a participant in a particular social activity or context related to the topic under study – is effective in *identifying intangible factors* such as social values and norms, beliefs, gender roles, socio-economic status and other socio-cultural issues which may not be easy to obtain from other forms of data collection methods. In this research, participant observation helped to interpret and better understand the complex reality of various specific situations and the implications of quantitative data obtained from surveys and case studies (Mack & Woodson 2005). For example, the participant observation method was used here to more fully understand the socio-cultural assumptions in cowpea breeding and cowpea variety preferences of various RSGs, which would not have been possible to obtain just by interviewing experts.

### *Data Analysis*

The first level of data analysis largely involved the use of the Statistical Package for Social Sciences (SPSS) and Advanced Excel as along with reflections on information and data collected from secondary sources. Primary data obtained from questionnaires were cleaned, descriptive information coded when possible and data entered into the SPSS for analysis. The SPSS outputs were exported to Microsoft excel for further analysis and generation of outputs for reporting. In the cowpea assessment, study data was subjected to Hierarchical Cluster Analysis by Jaccard's nearest neighbour method using Genstat Discovery Edition 3 software (VSN International Ltd., Hemel Hempstead, UK).

For qualitative data from expert interviews and group discussion, I read through the interview and group transcripts, and developed codes for coding and data review. Reviewing data involved a back-and-forth exercise of establishing themes, categories, patterns of interaction and interpretations emerging across the data.

The second level of analysis involved critical reflections of results obtained from the first level analysis. Using the technical code as an analytical tool, a retrospective view of the past cowpea breeding activities in Ghana was investigated through reflections on information and data collected, and then revealing the socio-cultural assumptions in cowpea variety design from the 'technical code' perspective vis-à-vis interpretative meanings constructed for cowpea variety among the RSGs. As explained, the critical-constructivist methodology required my constantly looking back and forth between theory, research questions and empirical data gathered for further elaboration on analysed data.

### *Study Limitations*

This research had to deal with some specific limitations which ought to be mentioned.

1. The absence of a food sovereignty movement in Ghana at the time of data collection implied a dependency on the international literature and debates of food sovereignty and without the opportunity to place these in the context of ongoing Ghanaian

analyses and debates. It is noted, however, that Groundswell International is now operative in Northern Ghana, an organisation that partners NGOs and social movements in Latin America, Africa and Asia to tackle food sovereignty issues, seeking to provide local solutions for rural development.

2. It was difficult to identify small-scale cowpea farmers in the GSFP participating communities who had access to markets created through the GSFP. Instead, small-scale *rice* farmers were studied to understand how the GSFP created access for their products to the domestic markets, assuming that the difference in the agricultural products does not overly change research results for an analysis of agricultural product accessibility to domestic markets.
3. During the research programme it was evident that a multidisciplinary research programme requires more resources and time. There was a lack of resources to conduct an extensive study of up-stream breeding activities at international research centres. In the gathering of data, I had to resort to communication through the Internet and gathering information from project documents, in conjunction with the interviews of many breeders working at the downstream breeding phase.

The general background of this research has been the international debate on food sovereignty. This has been nurtured in view of the location-specific context in which the research has been carried out. Despite the absence of that debate in Ghana, the actual situation in the country illustrates that there is still a huge need to combat poverty and hunger and to gear agricultural practices and policies towards a food sovereignty agenda (see Box 1.1). It is this context that led me to decide to apply and elaborate a critical-constructivist research methodology, in which it is aimed to find protagonists for social transformation.

## 1.7 Thesis Structure

This introductory chapter has outlined the conceptual framework of this research on cowpea variety development and market accessibility, studied from the scientific debate on food sovereignty. The chapter has presented an overview of the scientific discourses of science and technology studies and related the market accessibility study to the food sovereignty debate. Subsequently the theoretical position of the research in this scientific debates has been presented, concentrating on two key concepts employed in the two socio-technical research domains, those of codes, used to unravel the existing power relations in technology and market, and of RSGs indicating that other, neglected social groups may propose alternative social meanings to be encoded in the technology and market developments. Related to the specific position of the research in the scientific debate on technology and markets, the objectives and research questions of the applied critical constructivist research approach have also been formulated, and the (related) research methodology detailed.

Chapter 2 presents the *social relevance of cowpea at production level*, the way in which cowpea production, processing and consumption is *socially organised* and which *interpretative social meanings* are ascribed to the variety choice among RSGs in the cowpea network of Ghana/Benin. The chapter also identifies some pathways for enhancing food sovereignty within the local cowpea network.

**Box 1.1 Why the urgent need to combat poverty and hunger, and to re-orient agricultural development and policies towards a food sovereignty agenda in Ghana.**

The Ghanaian economy is agri-based with over 60% of the population depending on agriculture for their livelihoods (MoFA 2010). Agriculture plays a central role in Ghana's economic development, contributing more than a third of the country's GDP. Although there are some large farms and plantations, particularly for rubber, oil palm and coconuts, Ghanaian agriculture predominantly operates on a smallholder basis, with about 90% of farm holdings being less than two hectares in size and small-scale farmers accounting for about 80% of domestic production (MoFA 2010). Smallholder food crop farming is predominantly rain-fed and traditional technique / low mechanization based, leading to relatively low yields. Other factors militating against increased crop productivity are the relatively inefficient and low level of irrigation, high post-harvest losses, lack of agricultural finance, poor extension services as a result of several institutional and structural inefficiencies, and lack of ready markets and processing (METASIP 2009).

*About 28% of Ghanaian children are stunted, 8.5% are wasted and 13.9% are underweight (GDH 2008). 28.5% of the population lives below the poverty line, and some 18% of those are chronically food insecure (GSS, 2007).*

Considering the structure of the Ghanaian economy, it is clear that agricultural growth is critical to combating poverty and hunger. Aiming at the first Millennium Development Goal (MDG 1) of halving poverty and hunger by 2015 (as compared to 1990 levels), Ghana has developed a Medium Term Agriculture Sector Investment Plan (METASIP) that targets growth in agricultural GDP of at least 6% annually for the final period (2009-2015). The METASIP serves as policy implementation guide for intervention strategies outlined in the Food and Agricultural Sector Development Policy (FASDEP II). The Agricultural sector development policy document addresses the issue of promoting Ghanaian produce in both domestic and international markets, and targets a 50% increase in the marketed output of smallholders by 2015.

Currently, Ghana has no food sovereignty policy but the need to develop one has become critical. For Ghana to really combat poverty and hunger, I argue that agricultural policies must be geared towards a food sovereignty agenda on re-localization of food systems. Policy has to encourage local food production instead of imports, markets must be internally generated to offer job opportunities for small-scale farmers and processors, and food technologies need to be location specific and agricultural products reconnected to local consumption patterns (Quaye, 2007). From a food sovereignty perspective, agricultural development policy and action plans should promote good agricultural practices and build endogenous capacities for enhanced local marketing of agricultural produce. Action plans should also include the enforcement of anti-dumping regulations and promotion of locally grown produce for food aid programmes such as the Ghana School Feeding Programme studied here (Chapter 5 of this thesis). On R&D, action plans must highlight the need for a reversal of the top-down approach to research, and promote participatory research that is informed by the needs of technology users (Chapter 4) and improvements in the delivery of appropriate and tailor-made technologies.

Chapter 3 presents the assessment of *cowpea diversity on the Ghanaian market and variety preferences* by RSGs at the market level. This chapter identifies the diversity of cowpea varieties found on the (literal) markets surveyed and consumers' cowpea grain variety preferences. The empirical results presented in Chapters 2 and 3 frame the contextual background to the cowpea variety development analysed in Chapter 4.

Chapter 4 discusses the social organisation of past (and present) cowpea variety development in Ghana and examines the empirical findings concerning the asymmetric power relations among various RSGs and the differentiated extent of participation by RSGs in the cowpea variety development. Based on the technical code analysis, this chapter also presents possibilities for reconstructing cowpea variety designs to facilitate smallholder farmers' market access for enhanced food sovereignty.

Chapter 5 presents the empirical findings concerning the functioning of the GSFP to strengthen the relationship between local cowpea production of smallholder cowpea farmers and the marketing of that cowpea through school feeding. Issues addressed include the extent of participation by local social groups in the conceptualization of the GSFP, the codes in food procurement models and possibilities for reorganising the GSFP to facilitate domestic market access by smallholder farmers.

Chapter 6 presents the conclusions of this research on cowpea variety development and market accessibility by smallholder farmers. It summarises the answers to the research questions and reflects on the application of the two basic concepts – of codes and RSGs – for an investigation of Ghana's cowpea variety and school feeding programmes and the role that technology developments and market practices play in linking local production and consumption from a food sovereignty perspective. The chapter also i) indicates possibilities for reconstructing the local cowpea code through changing the composition and extent of participation of various RSGs in cowpea variety development and market accessibility; and ii) suggests ways in which local production-consumption links can be further developed in the approach to and organisation of the GSFP. In view of the specific location in which this research has been carried out, the thesis adds some policy recommendations for the enhancement of food sovereignty in Ghana. The thesis concludes with some reflexive remarks on enhancing food sovereignty on multi-disciplinarity.

## CHAPTER TWO

### Social organisation of cowpea production, processing and consumption and opportunities for enhancing food sovereignty<sup>3</sup>

#### 2.1 Introduction

*'Although food security may be successfully tackled at the global level, in marginalized areas, especially in sub-Saharan Africa, the number of food insecure people will rather increase. An estimated 700 million people will remain extremely poor in 2015, and about 600 million people will go hungry, unless new actions are taken.'* (IFPRI 2007)

Large numbers of people continue to suffer acute hunger in developing countries, particularly in Africa, despite the increased production of a variety of food commodities and implementation of several food security policies by development agencies (FAO 2003, IFPRI 2007, UNDP 2005) and prioritization of this most basic form of human suffering as a part of Millennium Development Goal 1 (to 'eradicate extreme poverty and hunger').<sup>4</sup> Projections by the World Bank to the year 2015 indicate that the number of people living in absolute poverty in sub-Saharan Africa is set to have increased from 315 million in 1999 to 404 million in 2015 (World Bank, 2003). Future predictions for the region, for example for the period until 2030 (World Bank 2007), are almost unremittingly bleak, with the numbers of people living in poverty in sub-Saharan Africa expected to be still rising over the next decades (see Box 1.1 for details on Ghana)<sup>5</sup>. It is in the face of this challenge of poverty and mass malnutrition and the expectation of its increase that an alternative approach of *local food networks* for rural food provision in particular has been stimulated by the ideas expressed in the food sovereignty debates (Fine 2004, Manzini 2005, 2008, Rosset 2006).

The significance of networks has generally been discussed in social science discourse as an alternative approach to the conventional conception of agricultural development in terms of industrialization and global food chains (Fine 2004, Rodriguez 2007, Manzini 2008). As Ruivenkamp (2005) has argued, global food chains have led to a disconnection between agriculture and production, on the one hand, and the local environment and consumption, on the other. This has resulted in a situation in which, instead of building on the natural and social productive capacities in marginalised communities to encourage local food production, potential producers are fed with food from a distance. Thus the concept of food sovereignty has

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<sup>3</sup> This chapter is based on the following two published articles:

(i) **Quaye, W.**, Adofo, K., Madode, Y. and Abizari, A. (2009). Exploratory and multidisciplinary survey of the cowpea network in the Tolon-Kumbugu district of Ghana: A food sovereignty perspective. *African Journal of Agricultural Research* 4 (4): 311-320.

(ii) **Quaye, W.**, Jongerden, J., Essegbey, G. and Ruivenkamp, G. (2010). Globalisation vs. Localisation: Global food challenges and Local solutions. *International Journal of Consumer Studies* 34:357-366

<sup>4</sup> <http://www.un.org/millenniumgoals/poverty.shtml>

<sup>5</sup> 'Global Economic Prospects 2007: Managing the Next Wave of Globalization' At: <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:23102056~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html>



drawn attention to local food networks, proposing an alternative, innovative trajectory which starts from the strengths of the local natural and social resources for agricultural development, and advocates for local people to take control of these natural and social resources.

Food networks are, by definition, community-based networks concerned with food production, processing and distribution. A network is built up around a set of relations among organisations and/or individuals collaborating to achieve some common goals at local, national or international levels (Henry et al. 2004, Powell 1994). In comparison to other relationships between organisations, networks have the potential to provide a more flexible and non-hierarchical means of exchange and interaction. This allows them to be more innovative, responsive and dynamic, while overcoming the spatial separations in the global organisation of agro-industrial food chains and providing opportunities for locally oriented food networks. Keck and Sikkink (2002) noted that networks are never static, but constantly evolving through contestation and resistance, creating space for co-existence for the local food networks alongside the emergence of global food production systems.

This chapter aims to reflect specifically on the social relevance of the Ghanaian part of the Ghana/Benin cowpea network, the potentialities of location-specific developments within the cowpea network and how such potentialities might be harnessed to enhance food sovereignty. It thus provides a background to cowpea network related issues that bear on variety development issues presented in Chapters 3 and 4 of this thesis.

The concept of *relevant social groups* (RSGs) is used to analyse the social relevance of cowpea production, processing and consumption in relation to variety choice in northern Ghana from a food sovereignty perspective. The cowpea network is chosen as the reference crop for this study because of its socio-economic and socio-cultural significance in local production, processing and consumption patterns (Langyintuo et al. 2003, 2004). Most farmers intercrop cowpea with other crops due to its nitrogen fixation capacity for soil improvement. Other considerations include its suitability as an income source for small-scale processors and its nutritive value, especially when the micronutrient availability is enhanced. Cowpea thus has a social-nutritionally defined role which might be strategically employed to demonstrate the potential of local food networks to reverse the damaging impact of global food chains, by reconnecting agriculture to the local environment, consumers to locally produced healthy foods, and farmers to productive resources such as locally improved seeds.

In this chapter the primary question is:

*How are cowpea production, processing and consumption socially organised and which opportunities can be identified for local developments from food sovereignty perspective?*

The sub-questions are:

- How are production, processing and consumption organised in the cowpea network?
- Which interpretative (social) meanings are ascribed to variety choice among RSGs in the cowpea network?
- What are the opportunities for local developments from a food sovereignty perspective?

First, I present the wider socio-cultural context within which cowpea production, processing and consumption are organised; then, I focus on interpretative (social) meanings of key RSGs in relation to their cowpea variety choices; and I finish by indicating opportunities for enhancing local developments from a food sovereignty perspective and particularly related to ‘glocal’ foods and participatory cowpea variety developments.

In order to address the research questions formulated above, an exploratory study of the cowpea network was conducted in selected communities in the Northern Region of Ghana. This study formed the social science aspect of a multidisciplinary team which carried out a Coordinated Network Study (CNS). Farmers, processors and consumers selected through snow-ball sampling in *Tibung*, *Wantigu*, *Nyamkpala*, *Gbanlilugu* and *Kpaligum* – all hunger hotspot communities in the Tolon-Kumbungu district of the Northern Region – were interviewed using semi-structured and structured questionnaires. Focus group discussions (Borgatti 1999) were also conducted to generate qualitative information on the cowpea network. These involved the use of guided and semi-structured interviews with key informants in the communities studied.

The Tolon-Kumbungu District was selected because of its rural and poverty characteristics, cowpea production-consumption linkages and the presence of the Ghana School Feeding Programme (GSFP), which was the focus of the nutritional studies aspect of the TELFUN project.<sup>6</sup> This chapter, therefore, may be regarded as a report on the sociological aspects of the Tolon-Kumbungu cowpea network study made alongside the TELFUN project. Data collection was compiled in August 2007.

## **2.2 Social organisation of cowpea cultivation, processing and consumption in Tolon-Kumbungu district**

### *Significance of cowpea cultivation*

Cowpea (*Vigna unguiculata*) is a major grain legume in Sub-Saharan Africa. Most parts of the Guinea, Sudan and Coastal savannahs as well as forest and transition agro-ecological zones, are suitable for cowpea cultivation. It can be grown on most soils in Ghana but is largely

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<sup>6</sup> The Tolon-Kumbungu District has estimated population of around 112,331 (based on the 2010 population census). The population is basically rural, with up to 90% directly dependent on agriculture. There are about 10,500 farming families, with an average household size of 16.8. The district covers a land area of nearly 2,400km<sup>2</sup>, of which only about a half is cultivated. Major food crops grown in Tolon-Kumbungu include cereals (maize, rice, sorghum and millet), root and tubers (cassava, yam and potatoes), legumes (groundnuts, cowpea, soybean, pigeon pea and bambara beans), vegetables (okra, tomatoes, pepper, onions, garden eggs, leafy vegetables) and fruit & nuts (cashew, mangoes, water melon, shea fruit).

concentrated in the savannah areas, mostly in the north of the country (Upper West, Upper East and Northern Regions) as well as in some districts in the Brong-Ahafo Region. Despite requiring at least 500mm of rainfall evenly distributed throughout the growing season, the crop is drought and heat tolerant.

Cowpea is cultivated for its leaves, green pods and grain for humans and livestock feed. In Ghana, it is estimated that livestock feed, wastage and seed constitute about 15% of domestic production of cowpea (MoFA 2009). Cowpea cultivation is an important component of traditional intercropping systems, in the complex subsistence farming systems of the dry savannas especially (Machuka 2001). Farmers there usually rotate or intercrop cowpea with other crops to improve soil fertility. Cowpea residues enhance the total porosity and water holding capacity of soils, while the plant fixes nitrogen at up to 240kg/ha, leaving about 60-70kg nitrogen for succeeding crops (MoFA 2005). The ability of cowpea to fix atmospheric nitrogen into the soil in association with certain soil organisms gives the crop a vital role in the local farming systems as a soil nitrogen content booster, especially for sustainable agriculture on marginal soils, which are widespread in the northern part of Ghana. This was attested to by around half of the farmers interviewed in the current study.

For the majority of the population in the Tolon-Kumbungu District, cowpea production and its processing for food is largely small-scale; basically at the traditional, family-based and smallholder level for subsistence and local sale. The socio-economic base of the local cowpea network that has emerged in Tolon-Kumbungu, therefore, is deeply embedded in the local culture, which strongly informs working practices and gender roles (Table 2.1). Cowpea cultivation is mostly performed by men, for example, while women play the more significant role in and after harvesting. Land preparation and seed propagation (by men) and processing (women) appear to be gender exclusive.

**Table 2.1** Proportion of males/females engaged in activities in the cowpea network<sup>7</sup>

Activity	Gender		
	Men (%)	Women (%)	Both (%)
Land Preparation	100	-	
Planting	56	-	45
Seed Propagation	100	-	-
Weeding	96	4	-
Agrochemical Application	96	-	4
Harvesting	11	70	19
Shelling	7	93	-
Haulage	30	70	-
Marketing	63	15	22
Processing	-	100	-

<sup>7</sup> All tables based on research carried out in Tolon-Kumbungu by the author (alone or with other members of the TELFUN team) during 2007.

The ‘cowpea culture’ of northern Ghana plays a major role in community life and the cowpea network has the potential to directly affect local development, particularly since cowpea is one of the major crops there. In Tolon-Kumbungu, farmers interviewed ranked cowpea third in terms of household income generation and household food provision, by 50% and 43% of respectively (2.2 and 2.3).

**Table 2.2** Relative importance of crops grown in terms of income<sup>8</sup>

Ranking	Crop	Response (%)
1	Groundnut	47
2	Rice	33
3	Cowpea	50
4	Maize	32
5	Yam	27

**Table 2.3** Relative importance of crops in terms of household food provision

Ranking	Crop	Response (%)
1	Maize	93
2	Yam	39
3	Cowpea	43
4	Rice	26
5	Sorghum	7

The importance of cowpea is particularly based on its *dual function* as a crop that offers both household *food provision* and *income generation*. It also has a well-established major *health value*, of obvious significance in the context of poverty and food sovereignty in rural areas like Tolon-Kumbungu. Cowpea is a major source of vegetable protein (23-30%), rich in vitamins A and C, and contains minerals (e.g. iron, calcium, zinc and phosphorus) and amino acids. The uniqueness of cowpea as a source of household food lies in its *availability during the ‘hunger season’*,<sup>9</sup> especially the early maturing varieties. With its high nutritional value, this in particular gives it the potential to reduce the consequences of malnutrition in young children, such as slowed growth and delayed development (Philip et al. 2003, Chinma et al 2008).

<sup>8</sup> Tables 2 & 3 give an indication of the relative importance of particular crops. The listing is based on the order of importance of the crops according to the weighted average of the total rankings given, with the percentage of respondents giving that particular ranking for that crop listed as % response.

<sup>9</sup> The hunger season is the period between planting and harvest, from February/March to July/August

### *Cowpea production*

Cowpea producers can be categorised into small, medium and large-scale farmers depending on the size of farm and purpose of production. Small-scale farmers, who are the majority, usually produce for subsistence use and sell any surplus, medium-scale farmers for both home consumption and sale, while the large-scale producers are commercial farmers. The majority of the farmers interviewed in the Tolon-Kumbungu district of Northern Ghana were cultivating an average of approximately 0.6 hectares of cowpea. In terms of income generation, approximately 93 per cent of respondents in the cowpea network reported farming activities as their main source of household income. Regarding cowpea varieties, at three variety traits were generally preferred the production level, those related to yield, disease and pest tolerance, and seed (bean) colour. Cowpea production constraints include the high cost of chemicals, insect and disease infestation, poor yields and erratic rainfall patterns.

Cowpea producers have strong collaborative ties with other actors in the network, especially the processors and consumers, and make conscious efforts for a sustained interaction. At the local level, cowpea farmers may themselves become both processors and consumers in a horizontal integration (as opposed to the vertical integration with users at a distance). Cowpea producers usually connect with consumers in the urban centres through traders who have profit motives (see Chapter 3). There is also strong collaboration with local researchers and extension agents of the Ministry of Food and Agriculture (MoFA), through crop improvement and participatory breeding programs. Indeed, these cowpea producers play an indispensable role in seed development activities (Chapter 4). Although they operate individually, it seems clear that they could organise or be organised into groups. It should also be emphasised that local seed growers – as custodians of genetic resources and indigenous farming related knowledge – have the capacity to provide information and fulfil management roles in participatory breeding programs (Almekinders *et al.* 2007) and so become effective vehicles for local developments from a food sovereignty perspective.

### *Cowpea processing*

The processing of cowpea into various food products is performed at different (traditional and industrial), co-existing levels. However, traditional processors are located in both rural and urban areas, while industrial/highly commercial processors are mostly located just in urban areas. Traditional processing is an exclusively female activity and creates employment opportunities for rural women. Women are the custodians of the traditional processing technologies and pass on these skills to generations through learning by doing, an informal



**Figure 2.1** Woman processor at work in Tolon-Kumbungu

apprenticeship system with every female child acquiring the inherited knowledge and abilities as she assists her mother (or sometimes aunt, etc.) on the job (Fig. 2.1). The gender aspect of this is continued into the consumption stage, insofar as a common usage for the home-made cowpea flour is as the first (weaning) food for babies. Thus, the capacity to process cowpea for home consumption becomes ingrained in the food culture of the society. Domestic production also accounts for much of the cowpea-based food sold on the street (and from shops), thereby connecting these traditional processing practices also to the small-entrepreneurial culture, which may lead to opportunities for up-scaling activities in local food networks. At industrial level, cereals are fortified with cowpea in weaning food formulations. In addition to the weaning foods, high protein cowpea flour for domestic food preparations has been developed by the national (state) Food Research Institute. These different and co-existing cowpea processing practices indicate that many different social groups (rural women, street food sellers, industries, research institutions) are involved in these practices. Investigation from the perspective of food sovereignty thus focuses on ways in which the resource-poor groups can enhance their position in these processing activities.

Interviews and observations the Tolon-Kumbungu district showed that raw cowpea beans are usually sorted, soaked and milled to obtain the flour for various food preparations (below, consumption patterns). The main cowpea processing constraint mentioned by respondents is the long cooking time, which runs to hours. To reduce this, salt peter (potassium nitrate) is added, and in some cases particular leaves from various local bushes (this also lessens the flatulence associated with cowpea consumption).<sup>10</sup> Close to 70% of the processors interviewed sourced cowpea from farmers in their localities. Since the basic raw materials for processing are purchased from the communities the local farmers incomes improve which suggests that promoting cowpea usage can improve local livelihoods in the rural economies.

### *Cowpea consumption patterns*

With a range of diverse food uses, cowpea is widely consumed in Ghana. The national consumption of cowpea per capita was estimated at 4kg in 2004, and 5kg for the years 2005 through 2007 (MoFA-SRID 2008). In terms of variety, Philip et al. (2003) mention over fifty traditional different dishes of cowpea, in both whole grain and milled forms and produced with cowpea-based mixtures. Ahenkora et al. (1998) have established the nutritional component and sensory attributes of cowpea leaves in Ghana. Foods involving cowpea leaves include *nyombeica* (a mixture of cowpea leaves and whole maize or cowpea flour steam-cooked), and *goara* (boiled cowpea leaves usually eaten with *koose*, deep-fried balls made with cowpea flour whipped with water) (Quaye et al. 2009a).

In Tolon-Kumbungu, most cowpea foods are flour-based, although whole grains are also used and the leaves are used in stews. Local foods made from cowpea include *tombrown* (weaning food from roasted maize and cowpea milled into flour), *koose* (prepared by adding water to cowpea flour, whipped, shaped into balls and deep fried), *tubani/gablee* (prepared from cowpea flour) and *apprepensa* (prepared from roasted maize meal and cowpea flour), along

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<sup>10</sup> Other issues related to processing constraints and detailed processing steps in the regional cowpea network have been investigated by the food technologist on the TELFUN Team (Madode et al. 2011).

with *goara* (boiled cowpea leaves) and *nyombeica* (cowpea leaves and whole maize or cowpea flour steam-cooked). Popular dishes are *waakye* (prepared from rice and whole cowpeas), *gari* and cowpea beans (*gari* being processed cassava), and *nagbechinge* (maize and cowpea). *Koose*, and to a lesser extent *waakye*, are consumed as street foods. Local processors report popular commercial cowpea-based products as including *gable*, *tubani*, *waakye*, *koose* and boiled cowpea beans. Non-commercially, six of the cowpea foods listed here are consumed regularly by most people, and one, *tombrown*, every day by two-thirds of the people interviewed (Table 2.4).

**Table 2.4** Frequency of consumption of cowpea-based foods in the communities studied

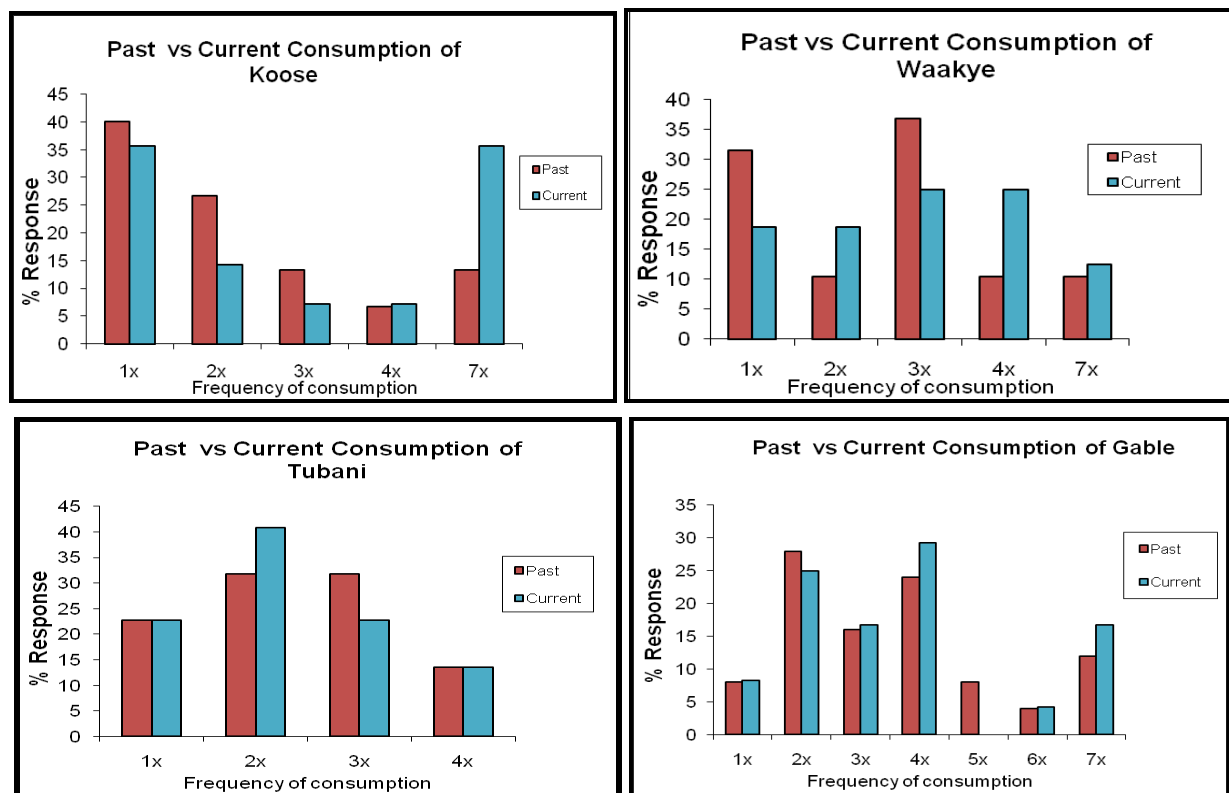
Food type	Frequency of Consumption (per week)							
	Once	Twice	Thrice	Four times	Five Times	Six times	Seven times	Rarely
<i>Gable</i>	8	30	19	23	-	4	15	-
<i>Koose</i>	33	17	11	11	-	-	28	-
<i>Waakye</i>	14	29	24	24	-	-	9	-
<i>Tubani</i>	29	38	21	12	-	-	-	-
<i>Nyombeica</i>	-	-	17	-	-	-	-	83
<i>Gora</i>	-	-	-	-	-	-	-	100
<i>Apprerensa</i>	33	33	33	-	-	-	-	-
<i>Tombrown</i>	-	33	-	-	-	-	67	-

In the Coordinated Network Study (CNS), respondents were also asked to compare their past (last 5 years, 2002-2006) and current (2007) frequency of consumption of cowpea based products per week. Most interesting here was not the score awarded for any single category by respondents, but rather the comparison between the past and present scores for each category. As can be seen (Fig. 2.2), these were generally close except for *koose* and to a lesser extent *waakye*, indicating that general consumption patterns of cowpea in the communities surveyed had not changed greatly over the period. A weighted average<sup>11</sup> was calculated, supporting this overall impression. The study results showed no significant change in consumption frequency patterns of *gable* and *tubani*, which were the most common home-prepared cowpea products (see also Chapter 3). However, there has been a significant increase in the consumption of *koose*, especially among those reporting the most frequent consumption (the seven-per-week group). Consumption of *waakye* had also increased slightly, again among the more frequent categories. As noted, *koose* and also *waakye* are characterized as street foods, so that would seem to be a likely explanation for the increased

<sup>11</sup> Weighted averages (of % response) for past and current consumption of *koose* are 15% and 21% respectively, for *waakye* 16% and 19%, *tubani* 21% and 23%, and *gable* both 13%.

reported consumption of these cowpea foods (especially since the *waakye* increase was reported to be in food bought on the street rather than prepared at home).

The positive change in consumption frequency patterns of *koose* and *waakye* as street foods seems, in turn, to be largely explained by the communities' efforts to develop food products for sale. Produced locally, these cowpea products can compete favourably with foreign (non-traditional) street foods like fried rice and breads. Also, the early maturing varieties enable the production of cowpea-based street-food in the planting season, which is particularly suitable for the intensive farm work during this period, and especially for the young lads whose age-gender culture makes street food an attractive option. As a result, street food cowpea products have a special role in preserving traditional food culture – which, indeed, has been a driving force in the development of the local cowpea network. In fact, the cowpea network as a whole can be regarded historically in terms of the centuries' long development of a traditional food supply process (farming-processing-consuming), which is now supplemented and challenged by the more recent emergence of the production/consumption practices of commercial enterprises serving the regional and national markets of which the local provision of local street foods is a part.



**Figure 2.2** Past vs. current weekly consumption frequency of *gable*, *tubani*, *waakye* and *koose*

In brief, cowpea production, processing and consumption have been organised at different levels (small, medium and large) to suit local specific societal needs, causing cowpea to have a high social relevance in the local complex of food networks. In the *local farming system*, cowpea is important for fixing nitrogen in the soil and as a primary source of protein for the rural households. In the local food network surveyed, cowpea is produced for both



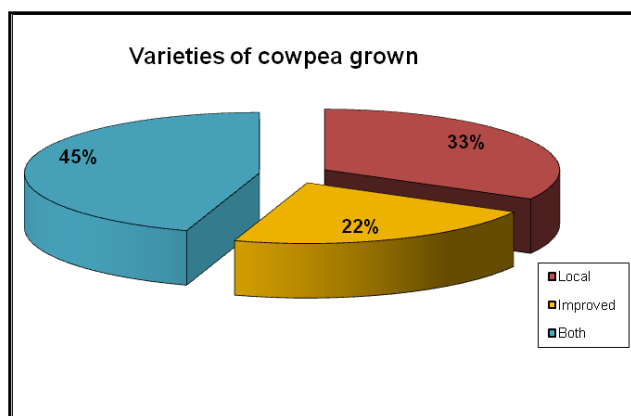
subsistence and commercial purposes, with an important role in household food provision and income generation.

*Cowpea processing* creates employment opportunities and a sustainable livelihood option for women in rural communities, with processing skills passed on from one generation to another. Some of the cowpea processed foods like *waakye* and *koose* are emerging as important street foods that can compete favourably with foreign foods and give cowpea a special role in preserving local food culture. This has contributed to the contemporary commercial practices that are combining with and reshaping the traditional food supply process of (subsistence) production (farming), and (home) processing and consumption.

It is in the *coexistence* of the local cowpea food network and emerging entrepreneurial culture associated with economic development of national and global food chains that provides the context for the investigation here of opportunities to promote a food sovereignty approach for the strengthening of local developments. Before discussing these opportunities, however, I will first discuss the variety preferences of different relevant social groups (RSGs) in the cowpea network.

### 2.3 Social meanings ascribed to cowpea variety development

Interviews investigating the social meanings ascribed to variety preferences for cowpea cultivation, processing and consumption in the Tolon-Kumbungu district identified three major categories of actors or groups in the cowpea network: technology developers, end-users and intermediary groups. In the category of technology developers, there were two RSGs, those of international and local breeders/researchers. In the end-user category, the key RSGs were found to be the farmers, the processors, consumers and traders. Other RSGs in the cowpea network – in an intermediary category as neither users nor producers of the technology – included donors, extension agents, administrators, and government and non-governmental organisations working with farmers, among others. Within each RSG, various subgroups could be delineated according to level of operation and the social implications of cowpea within specific operational contexts (e.g. see distinctions between processors, below). Below I highlight the interpretative social meanings underpinning cowpea variety choices by farmers as the key RSG at the production level. In the next chapter I will shift attention to the social meanings ascribed by the end-users (consumers) to cowpea variety preference at the market level. In both chapters, attention is also paid to food processors, seen from production and market perspectives.



**Figure 2.3** Proportions of cowpea variety grown

### *Variety choices at production level by farmers and food processors*

Usually farmers attached social meanings to variety choices according to the purpose of cultivation, namely, household food security or commerce. Related to these two cultivation purposes, two main types of varieties were discerned, local varieties (landraces) and improved varieties. Between a fifth and a quarter of the farmers in the survey area cultivated solely improved varieties for commercial purposes, almost a third only local varieties for household consumption and a little under a half a mix of both local and improved varieties (Fig. 2.3). A slight majority of the farmers interviewed (56%) used seeds from their own farms, with the remainder sourcing seeds locally from friends and/or other farmers who preserve seeds for sale.

Generally, at the production level, the three most preferred variety traits for cowpea breeding considerations were found to be related to yield, tolerance to diseases and pests, and seed colour. Other reasons for seed preference referred to product use, i.e. preparation/cooking properties of the peas. Comparing the improved and local varieties, it is possible to make the general statement that despite the lower yield potential and a tendency to creep, local cowpea varieties are preferred over improved varieties by those farming to provide household food, and for three reasons.

First, *autonomy in seed production* is important to small-scale, subsistence farmers. Although they regularly acquire seeds from other local sources, these farmers generally prefer to produce their own seeds and preserve strains, for later use as well as for posterity. Producing their own seeds is valued by farmers as a traditional practice assuming independence and thus valued as a good in its own right. Also, in the absence of community-owned gene banks, these farmers have taken it upon themselves to conserve biodiversity, and not just to insure for their possible future livelihood needs but also as a cultural legacy of and for the community. It is in this context that farmers are motivated to request training in seed conservation and thereby ensure autonomy in seed access.

Second, the farmers prefer local varieties because they consider *a range of characteristics* other than just yield (at which the improved varieties are primarily aimed), such as level of external input usage, maturity, resistance and food culture. In particular, farmers explained that due to the high resistance to the harsh environmental changes and to diseases and pests of local varieties, there was no critical need for agro-chemical application, which both had low cost implications and allowed the leaves to be used as vegetables in the local dishes.

Thirdly, farmers at the subsistence level have to ensure that *family needs are met first*, before, that is, thinking about selling. Those practicing mixed arable farming – in terms of cowpea variety as well as crop type – tend to use local varieties with domestic food security needs in mind (and use the improved varieties more to provide financial income). In this respect, local varieties are preferred because they offer a more *guaranteed food supply* (being less susceptible to environmental pressures), are *early maturing* (provide food soonest after the hungry season) and also have *high storability* (reducing the need for seed purchase the

following year). Table 2.5 shows the potential yield differences in local and improved cowpea varieties.

Improved varieties are high yielding (in optimum or at least sufficiently suitable conditions), and erect (less bushy or prone to creeping, and thus more efficient in terms of land and water usage). The cultivation of improved varieties is motivated by their high yielding characteristics and high market value (improved variety cowpeas fetch significantly higher prices). Farmers preferred traits for breeding considerations in respect of improved varieties are, in decreasing order of importance, yield, tolerance to diseases and pests, seed colour, market price, plant morphology, taste and cooking time (Quaye *et al.* 2009a). Early maturation was also found to be important as farmers constructed meanings for improved varieties (as, during interviews, they expanded their thinking to less obvious possibilities).

Disadvantages associated with the improved varieties are the high cost of agrochemicals, low tolerance to insects and diseases, drought and heat (which necessitates the agrochemical input), and difficulty in seed preservation for propagation. Farmers using improved varieties have to buy agrochemicals and seeds, which is not only an obvious financial burden keenly felt by local smallholders – reducing the profit of sales and essentially devaluing the financial reward for their labour – but also makes them dependent, referring again to the desire of the farming households (and communities) for autonomy. Certainly farmers complained about their felt over-reliance on the seed industry.

**Table 2.5** Local and improved cowpea varieties grown and their characteristics

**LOCAL VARIETIES**

<i>Sanzipele</i>	White seed coat, black eye, narrow leaves, erect stem	< 1.0
<i>Sanzi zee</i>	Brown seed coat, diseases & pest tolerant	< 1.0
<i>Sanzisabli</i>	Black seed coat	< 1.0
<i>Nyimpasabli</i>	Black seed coat, late maturing	< 1.0
<i>Milo</i>	Light brown seed coat, early maturing, tasty, erect stem	< 1.0
<i>Tuupele</i>	White seed coat, creeping, high yielding, tasty	1.0

**IMPROVED VARIETIES**

<i>Akpaagbala</i>	Erect, white seed coat	1.8
<i>Vallenga</i>	Red seed colour	2.0
<i>Bengpla</i>	Erect, white seed colour, not easy to boil	1.5
<i>Marfo-Tuya</i>	Erect, white seed colour	2.0

Cowpea processors interpreted variety differently from farmers and even within groups of processors there were subtle differences in variety preference depending on type of food processed or consumed. Processors of *koose* and *tubani* considered *good whipping ability* in their variety choice, while those using cowpea for *waakye* and boiled beans selected for *shorter cooking time*. Generally, processors at the production level preferred *white seed cowpea varieties, short cooking time and taste*. Processors ascribe these social meanings to both improved and local varieties (Table 2.6), indicating that food (preparation and product) characteristics rather than variety types influence their variety preferences.

At the production level, therefore, important social factors that influence the variety preferences of farmers and processors are the existing local farming systems with their different purposes of production (orientated to food provision and/or income generation), scale of production and gender roles, along with the processing and consumption practices and other aspects such as maintaining autonomy in seed preservation and its environmental resilience. These social factors combine with the already existing technical characteristics present in cowpea varieties like yield, tolerance to diseases and pests, seed colour and early maturity.

In general, farmers attach social importance to variety choice depending on the purpose of cultivation, for household food security reasons and/or commercial purposes. Small-scale farmers weigh up the pros and cons among the variety of options related to a variety of technical and social factors. For the farming systems primarily focused on household food provisioning, it was observed that farmers are less interested in high crop yields than in a balance of high yield, environmental tolerance and taste suited to traditional dishes. The climate, disease and pest resistance of the local varieties not only enable the avoidance of the inputs costs of agro-chemical application, but also allow the leaves to be used as vegetables in the local dishes. Local varieties are also preferred for their early maturing characteristics, which facilitates household food provision during the hunger season. Subsistence farmers have to ensure that family needs are met first, before thinking about what to sell. Within the subgroup of subsistence farmers practicing mixed arable farming primarily use local varieties with domestic food security needs in mind and treat higher yielding improved varieties more as a means to provide a financial income from production surpluses. White seed varieties generally are selected for their nutritional value.

Small-scale farmers also consider autonomy in seed production as an important factor in variety choice insofar as it enables low or no financial costs for seed replenishment and also offers a means to preserve their biodiversity and a cultural legacy for the community. Small-scale farmers generally prefer to produce their own seeds and preserve strains both for later use as well as for posterity. The extreme resource limitation of small-scale farmers makes the practice of seed saving more of a necessity, but producing their own seeds is also valued in itself as a traditional role and a practice that empowers them to manage their natural resources.

**Table 2.6** Physical description and culinary properties of cowpea varieties encountered at Tolon-Kumbungu (processor level)

**IMPROVED VARIETIES**

<i>Akpaagbala</i>	White	White	Medium	2-6h	2-12h	Medium	9
<i>Tuya</i>	White	White	Variable	2-4h	2-12h	High	11

**LOCAL VARIETIES**

<i>Bolgabolga</i>	White	White	Big	2h	3-7h	Medium	2
<i>Gampawi</i> (black eye)	White	White	Big	2-3h	3-6h	Medium	5
<i>Gampawi</i> (brown eye)	White	White	Big	2h	4h	Medium	2
<i>Milo</i>	Brown	White or cream	Medium	2-3h	2-12h	High	11
<i>Sanzee sable</i>	Black	Yellow	Small	2-6h	24h	Medium to low	5
<i>Sanzee zee</i>	Red	White	Small	2h	2-6h	Low	2

Quaye et al 2009a \*Number of processors using variety (from sample of 16)

**2.4 Opportunities for local developments from food sovereignty perspective**

The empirical research of the Tolon-Kumbungu social organisation of cowpea production, processing and consumption (Section 2.2) and the social meanings ascribed to cowpea variety choices by farmers and processors (Section 2.3) clarified that there is a broad spectrum of diversified farming systems with different variety preferences. At one end of the spectrum there is purely subsistence farming, focusing almost exclusively on food provision and using local varieties (landraces), with cowpea variety preferences strongly linked to those traits providing household food security, which tends also to involve autonomy. At the other end of the spectrum, there is the entrepreneurial farming system focusing primarily on income generation and participation in domestic and even global markets for their inputs and outputs. Between these, there are a range of diversified farming systems combining different aspects of both systems and having their own specific cowpea variety preferences, although the subsistence farming emphasis on food security (and autonomy) prevails.

Given the empirical analysis of cowpea production and household processing and consumption as well as the social meanings ascribed in the various cowpea varieties, the research now moves towards the aim of enhancing food sovereignty in the district.



**Figure 2.4** The soil fertility of dry land is improved by cultivating cowpea

First, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of the cowpea networks in the Tolon-Kumbungu district is made (Box 1); then I look for possibilities to harness the strengths and opportunities from the perspective of food sovereignty.

### **Box 2.1 SWOT analysis of the cowpea network in Tolon-Kumbungu**

#### ***Strengths***

- *Availability of farm labour, need of people to work*
- *Custodians of genetic resources and indigenous farming and processing related knowledge*
- *Ability to discern crop varieties that can withstand challenging environmental conditions*
- *Ability to conserve seed and biodiversity*
- *Ability to diversify production to meet community specific consumption patterns and maintenance of food culture*
- *Use of crops like cowpea to improve soil fertility and organic farming practices*

#### ***Weaknesses***

- *Poor soil fertility and environmental degradation*
- *High cost of seeds and other agricultural inputs relative to local resources*
- *Lack of irrigation facilities/services (although water sources are available that provide potential for irrigation facility construction )*
- *Lack of production credit facilities, reducing the capacity of local farmers to access productive resources*
- *Weak political commitment to invest in agricultural sector, especially the food crops sub-sector*

### ***Opportunities***

- *Soaring food prices, which create incentives to produce locally*
- *Re-localization of production-consumption patterns; gradual emergence of ‘glocal’ food products (koose/waakye as street foods)*
- *Increasing demand for healthy, and (local) origin-based foods; social dimensions of food*
- *Empowerment of smallholders and support to rural economies through self-organisation (thus maintaining autonomy)*
- *Increasing attention for ecologically sound production practices as a result of environmental change effects*
- *Food provision recognised as part of ecosystem services*

### ***Threats***

- *Unreliable weather; low but sometimes excessive rainfall leading to drought or floods*
- *Pressure on productive resources due to change in agricultural landscape*
- *Increased cost of agricultural inputs*
- *Trade liberalization and removal of agricultural subsidies in developing countries, allowing influx of cheaper foreign products and crowding out local farmers from their own markets*
- *External factors such as seed companies taking over the traditional roles of farmers*
- *National agricultural policies that focus on modernization without concrete plans for redundant labour created in the process*

A key aspect in proposing another developmental trajectory – inspired by the food sovereignty debate – is to strengthen locally embedded developments by starting from some of the above mentioned strengths of the local social and natural resources and to search for opportunities for local people to take and extend control of these. In this respect the research indicates that the local cowpea network can be strengthened by building on i) the role of farmers as custodians of genetic resources and indigenous farming knowledge, and ii) the abilities of farmers to discern crop varieties able to withstand harsh and changing environmental conditions and iii) conserve seed and biodiversity (see Fabricius *et al.* 2007). Cowpea’s high nitrogen fixation rate may be considered as a particularly important resource (to be developed) enabling small-scale farmers to tackle poor soil fertility and environmental degradation problems. Indeed, small-scale farmers employ a variety of strategies in order to deal with the difficult environmental conditions that threaten their livelihoods. They practice cropping system adaptations, strategies such as changing varieties and planting times, and they are willing to consider tradeoffs among the variety of options related to insect tolerance characteristics, early maturing varieties, low input requirements, self-pollinating seeds and high yields.

Regarding the issue of seeds, the ability of local farmers to preserve and reproduce seeds was found to be very important. With the ever increasing cost implications of commoditized seeds, farmers complained that improved variety seeds have to be purchased (from meagre financial resources) for planting each year. This they regard as resulting in an over-reliance on the seed industry, which places them in a vulnerable position, when they are convinced

that seeds can and should be preserved locally. Indeed, most farmers interviewed avoid purchasing from certified seed dealers, using seeds from their own farms or from friends, or buying them from other farmers.

The peasant farmers seek to have their own seed stock *season after season* to ensure that they do not lose their premium varieties which they have carefully selected over time to meet their needs. Cowpea landraces not only meet the technical needs of agricultural but also social goods, including their important roles in various local dishes for the farmer's household at various times of the farming season. Farmers regard it as a critical issue not to sacrifice their own *seed stock*, for anything (a form of empowerment). In the case of commercial and educated farmers who have accepted new technologies (new varieties), they will always go for new hybrid seeds for each season because it is required of them if the desired output (production level) is to be reached.

Parallel to these findings, two clear opportunities for enhancing food sovereignty can be identified. First, small-scale farmers showed a preference based on the demands of household provisioning (food security) for early-maturing local cowpea varieties that are insect tolerant, disease resistant and give relatively good yields with no or little agrochemical input (enabling autonomy); and they prefer improved (high yielding) varieties for commercial, marketing purposes. Such differences in variety preferences depending on the purpose of cultivation need to be considered in *participatory breeding* efforts. With seed as an important production resource, it is vital for the enhancement of food sovereignty that farmers be empowered in the seed production process. This will also ensure conservation of biodiversity. Farmers' desires for training in this area should also be met in the interests of food sovereignty. These variety concerns are investigated further below (Chapter 4).

On the consumption side, the development of the cowpea network around street food production and the evident popularity of *koose* and also *waakye*, especially among young people, are noteworthy. The study showed that these local street foods are beginning to play a significant role in maintaining traditional culture and stimulating localized development. The street foods represent an important social strength within the cowpea network and indicate a potential for the development of '*glocal*' foods. These may be regarded as foods that have entered into niche markets created as a result of global-local interactions (Quaye *et al.* 2010a, Appadurai 2008), and are characterized by their ability to re-localize food production and consumption through their special aesthetic qualities, such as distinctive taste or freshness (Sinnino & Marsden 2006).

Locally, for example, further improving the nutritive qualities of *waakye* and *koose* can increase their competitiveness with foreign foods like fried rice and bread, which can subsequently enhance food sovereignty on a national scale. Exploiting the added advantage of unique taste for local cowpea-based foods can help to reconnect agricultural products to local consumption patterns (as attempted by the nutritionist in the TELFUN team). From the food sovereignty perspective, food has socio-dynamic dimensions: it can reconnect production to consumption in local communities, and it can contribute to the realisation of a basic human right to healthy, culturally appropriate and locally acceptable food.



## 2.4 Concluding Remarks

In collaboration with my other Ghanaian colleagues of the multidisciplinary research program TELFUN, I have carried out a Coordinated Network Study (CNS) to gather data on the cowpea production, processing and consumption in the Tolon-Kumbungu district as a starting point for multidisciplinary research activities. Findings about the social organisation of cowpea production, processing and consumption as well as about the social meanings ascribed to cowpea varieties by farmers and processors are presented in this chapter. I have also indicated opportunities for enhancing food sovereignty with two clear possibilities for an enhancement of food sovereignty in the local communities of the Tolon-Kumbungu District, related to *participatory breeding for preferred varieties* (the technology aspect) and *glocal foods* as entries into domestic markets for cowpea-based food products.

Concerning the issue of participatory cowpea breeding, the empirical research shows desired traits to be based on the duality of purpose of cultivation, with cowpea farmers generally preferring local variety characteristics for household food consumption and improved cowpea varieties from the perspective of market value. These differences in variety preferences need to be considered in participatory breeding efforts in order to improve on the access to and use of production resources. The empirical research shows that the three most preferred variety traits for breeding considerations are yield, tolerance to diseases and pests, and seed colour. Early maturation was also found to be important. There are explanations to this preference ranking (assuming the desire for high yield to be self-explanatory). First, small-scale farmers build resilience to food insecurity through local food sovereignty strategies and resist varieties that rely heavily on external inputs; hence, the preference for varieties with high tolerance to diseases and pests. Small-scale farmers informally conserve the genetic resources of seed varieties and also complain about the idea of having to buy seeds for planting each year, which combined to lead them to request for training in seed conservation. Second, white seed coated varieties are mostly preferred because they are seen as nutritious and, from the processors' point of view, have good whipping ability. Third, early maturing varieties are important for household food provisioning during the hunger period. Finally, it is recommended that the cultivation of local varieties whose potential in terms of yield is low, needs to be addressed quickly to ensure conservation of biodiversity and improved livelihoods for the local people operating at subsistence level.

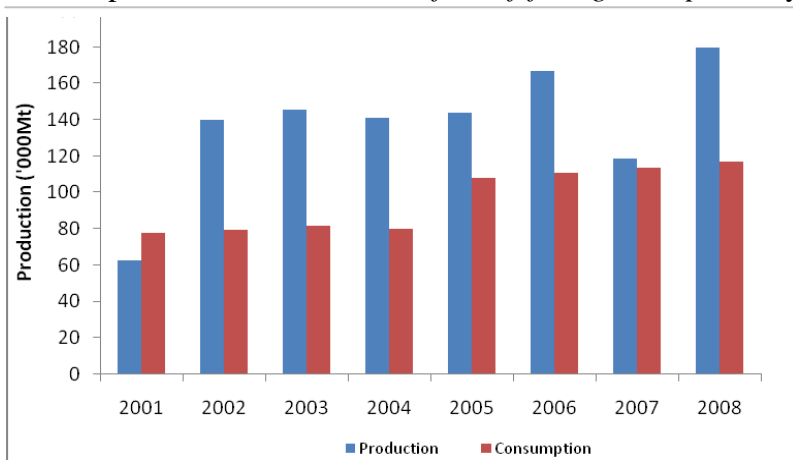
Regarding glocal foods, the emergence of *koose* and *waakye* as street foods in the cowpea network illustrate the opportunity for integrating origin-based food products in local consumption patterns which are partly influenced by the global ideology of fast-food consumption. In Ghana, fast-food consumption patterns take the form of street foods, which, when built upon local dishes represent a location-specific example of glocal foods that create a market for local food vendors and farmers and enhance their food sovereignty.

## CHAPTER THREE

### Consumers' cowpea variety preferences<sup>12</sup>

#### 3.1 Introduction

Although Ghanaian cowpea production has consistently out-stripped consumption over the last decade (Fig.3.1), the country has been importing about 10,000 tonnes annually (Langyintuo *et al.* 2003, Seferiadis 2009). Alongside various production constraints, such as pests and diseases, (deteriorating) environmental (soil and climatic) conditions, lack of credit, poor storage facilities and a poor transportation network, the *influx of foreign cowpea* may become another threat to Ghanaian cowpea production if local consumers prefer the foreign cowpea and the government applies a trade liberalisation policy (Box 2.1). In that case, the influx of foreign cowpea may lead to a crowding out of small-scale farmers from their domestic markets and enhance the problems of rural malnutrition and poverty



**Figure 3.1** Ghanaian cowpea production and consumption (2001-08) (MoFA-SRID, 2009)

As part of the multidisciplinary Telfun research program, I have conducted a socioeconomic assessment of cowpea diversity on the Ghanaian market, in collaboration particularly with the plant breeder of the Ghana/Benin team.<sup>13</sup> A total of 47 cowpea samples were collected from traders, who, in view of their key position in marketing relations, were also interviewed. Samples were taken for a morphological characterisation in order to ascertain the degree of diversity of cowpea varieties found on the domestic market. The samples collected from the (literal, outdoor) markets surveyed consisted of varieties from both Ghana and other countries.

The objective of the social scientific aspect within this multidisciplinary research survey was to investigate *consumer preferences* for cowpea varieties as perceived by traders and by the consumers themselves, and to indicate *opportunities for integrating these preferences* into

<sup>12</sup> This chapter is based on the published article: Quaye Wilhelmina, AdofoKwadwo, Buckman Evelyn Serwah, Frempong Godfred, Jongerden Joost and Ruivenkamp Guido (2011). A socioeconomic assessment of cowpea diversity on the Ghanaian market: Implications for breeding and food sovereignty. *International Journal of Consumer Studies* 35:679-687.

<sup>13</sup> Adofo Kwadwo, engaged in PhD research on participatory breeding for local food networks and the role of Ghanaian cowpea genetic diversity.

cowpea breeding. The novelty in the research design was the practical collaborative efforts by social scientist and plant breeder in elucidating marketing concerns and preferences with a view to incorporating these into breeding programs in a manner orientated towards enhancing food sovereignty.

Concerning marketing relations, the cowpea grain trade in Ghana is organised by private individuals who transport grain from the production to the consumption centres.<sup>14</sup> Co-ordination of the activities of these traders is informal, with each actor making the necessary arrangements for an efficient execution of his or her business to derive maximum satisfaction and meet a societal need. Wholesaling of cowpea grain is performed by both men and women, while retailing is largely done by women.

Farmers typically sell their marketable supply to rural assemblers, who in turn sell to urban wholesalers directly or through commission agents. In general, wholesalers hold large stocks for sale to retailers when prices become highly economic and competitive enough to pay for the operational cost (procurement, storage and handling) and ensure a satisfactory profit margin. Wholesalers may be grouped into small, medium or large entities, according to their working capital and storage capacities. They maintain a network of agents to facilitate a sustained supply of cowpea for effective and efficient operations. Retailers procure relatively small quantities of cowpea for sale, from either wholesalers or commission agents. There is a substantial movement of cowpea from the Upper East, Upper West and Northern Regions to Techiman in the Brong-Ahafo Region, which serves as a distribution centre for food crops destined for southern Ghana (mostly to Greater Accra, Central and Ashanti Regions).

The survey was conducted in eight daily markets in two major cities, Accra and Kumasi. Samples of all cowpea varieties found on the markets surveyed were collected for morphological characterisation by the cowpea breeder and traders and consumers interviewed. As mentioned, the objective of the social scientific part of the study was to assess the consumer preferences for cowpea varieties as perceived by the traders and by the consumers themselves with a view to integrating these into new forms of *participatory breeding activities* to improve the embedment of the cowpea crop within location specific developments as inspired by food sovereignty ideas.

By definition, participatory breeding is the involvement of scientists, farmers and other actors, such as consumers, extension officers, vendors, industry and rural cooperatives in plant breeding research (Sperling et al. 2001). In this research, I have focused on whether consumers (and traders) can become involved in participatory plant breeding activities and be considered – alongside small-scale farmers (Chapter 2) – as important relevant social groups (RSGs) for cowpea breeding. This work is pertinent insofar as breeding institutions have not yet decided whether, let alone how, consumers are to be given the opportunity to express their variety preferences for the formulation of priorities in breeding activities. In order to stimulate such a participatory variety development approach, therefore, it has been decided to

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<sup>14</sup> 'Grain' here refers to the beans (for eating) or seeds (for sowing), but essentially from a trading perspective (see Ch.2, note 8).

disseminate the findings of the survey to cowpea breeders for the development of market driven varieties.

### 3.2 Survey objectives and methodology

#### *Objectives*

Specific objectives of the survey are:

- To establish the *diversity* of cowpea varieties found on the markets surveyed
- To identify consumer cowpea grain variety *preferences* as perceived by *traders and consumers*
- To make *recommendations for the development of tailor-made varieties* that will facilitate domestic market access by small-scale farmers for enhanced food sovereignty.

#### *Methodology*

A market survey was conducted between April and July 2009 in the street markets of Accra (Ghana's capital city) and Kumasi (the second biggest city and capital of Ashanti Region), both in the southern part of the country. Eight markets were selected: *Mallam Atta*, *Nima*, *Makola* and *Madina* in Accra, and *Amakom*, *Anloga*, *Alabar* and the central market in Kumasi. All the markets were urban retail markets organised daily with high participation of cowpea consumers. A total of 80 traders and 75 consumers/food vendors were systematically sampled. Firstly, the number of subjects (consumers or traders) in a particular survey area was estimated. Secondly, every  $k^{th}$  subject was interviewed until the required sample size was obtained, where the sampling interval ( $k$ ) was obtained by dividing the total estimated consumer/trader number by the (predetermined) sample size. Ten traders per market and between five to ten consumers per consumption area close to the selected markets were interviewed. All the people interviewed were women (In Ghana, retailing of grains is mainly done by women and between the ages of 30 and 50).

In relation to consumer preference criteria, a structured questionnaire was designed for one-on-one interviews. The questionnaire covered the cowpea market price (price per kilo), preferred characteristics and reasons, popular uses and sources of supply on the Ghanaian markets. The questionnaire was pre-tested in the *Makola* market after which necessary changes were made to ensure consistency of responses. In addition to the one-on-one interviews, group interviews were conducted among traders inviting them to freely list what they perceived as consumer preferences for cowpea (Quinlan, 2005). Consumer preferences were ranked in two ways: consumers' preferences as perceived by traders were solicited from traders in group interviews and rankings compiled from this, while consumers themselves gave their own rankings in the one-on-one interviews. In addition to the market survey, 47 cowpea samples were collected from the traders for an investigation of morphological character. The objective of this was to check whether these samples were indeed different from each other as per the measured seed traits (i.e. in terms of physical characteristics such as seed colour, eye colour, size and shape).

### 3.3 Findings

#### *Foreign and local cowpea varieties found on the markets surveyed*

On the eight markets surveyed, traders name the varieties after their place of origin. For example, traders refer varieties as ‘Togo’ cowpeas when these cowpea varieties come from Togo. Table 1 shows the distribution of cowpea varieties found on sale at the markets surveyed, according to their place of origin. The survey showed foreign cowpea varieties to be very popular. Between a third and a half of traders were selling cowpeas sourced from outside the country – Niger (62% of traders), Burkina Faso (50%), Togo (46%) and Nigeria (36%) – only around a fifth coming from within Ghana (18-21%) (Table 1). Local cowpea varieties (Bawku Red, Ejura White and Ejura Red) were sourced from the Upper East, Upper West and Northern Regions in the north of the country, and the Brong-Ahafo (Ejura) and Volta Regions in the central band.

**Table 3.1** Popularity of cowpea varieties (mainly differentiated by place of origin) according to number of market traders selling them (%)

Market	Niger	Burkina	Togo	Nigeria	Bawku Red & White Ghana	Ejura White Ghana	Ejura Red Ghana
<b>Accra</b>							
Mallam Atta	100	70	90	50	20	-	-
Nima	80	40	100	100	40	20	10
Makola	40	-	70	50	30	20	10
Madina	60	10	100	80	60	-	10
<b>Kumasi</b>							
Alabar	50	90	-	-	-	10	20
Central	20	80	-	-	10	-	20
Anloga	90	20	-	-	-	-	-
Amakom	60	90	-	10	10	40	40
<b>Overall</b>	<b>62</b>	<b>50</b>	<b>46</b>	<b>36</b>	<b>21</b>	<b>18.5</b>	<b>18.5</b>

Traders usually sell several varieties of cowpea at a time. Table 3.1 was therefore generated by estimating the proportion of traders out of the total number of traders interviewed in a specific market selling a particular variety. For example, in *Mallam Atta* market in Accra, all the traders interviewed were selling ‘Niger Cowpeas’, 70% of the traders were selling ‘Burkina Cowpeas’, and so on. The overall percentages were calculated from the averages of the total sample of traders interviewed over the survey period (See final row, Table 1).

There were a lot of mixtures of foreign and local cowpea grains, sometimes deliberately combined by traders using the price differentials due to the perceived superiority of certain varieties to maximize profit margins. According to traders interviewed, locally produced cowpea was not common on the markets three months after harvesting, basically due to storage problems. In group interviews among traders, it was clear that foreign cowpea was gaining high acceptance among Ghanaian consumers as the expense of the locally produced cowpea.

**Table 3.2** Characteristics cited by traders and uses for popular local dishes of popular cowpea varieties (mainly differentiated by place of origin)

Variety	Place of Origin	Characteristics Cited by Traders	Popular Dishes
<b>Niger</b>	Niger	Many colour variations (white with black eyes, white with red spot, brownish), small-medium sizes, cooks faster, susceptible to weevil attack, extremely tasty.	<i>Gari &amp; beans, aboboi, koose, waakye, tubani (steamed cowpea flour), stew</i> ; mostly prepared for domestic & commercial purposes (also see Ahenkora et al 1998).
<b>Burkina /Ougaa</b>	Burkina Faso	Small sizes, shades of white with black or brown eyes, very clean or well sorted, easy to cook, tasty but low swelling capacity.	<i>Aboboi, gari &amp; beans, koose, waakye, stew</i> , mostly for domestic & commercial purposes.
<b>Togo</b>	Togo	Medium-large sized grains, white colour and black eyed, cooks fast but not too soft, high swelling capacity and tasty.	<i>Aboboi (boiled cowpea), koose, waakye</i> ; mostly for domestic & commercial purposes.
<b>Lagos</b>	Nigeria	Large sized grains, white colour and black eyes, well sorted and very clean, extremely soft, cooks faster and very tasty.	<i>Gari &amp; beans, stew</i> ; mostly just for domestic use.
<b>Bawku Red</b>	Northern Ghana (Upper East)	Medium size, hard to cook but gives good food presentation; highly perishable (insect infestation) if not chemically treated.	<i>Apprepensa, waakye, koose</i> ; mostly just for domestic use
<b>Bawku White</b>	Northern Ghana (Upper East)	Smaller sizes, relatively long time to cook, white colour (some with black eyes), tasty.	<i>Gari &amp; beans, aboboi, koose, waakye, tubani, stew</i> ; mostly for domestic & commercial purposes.
<b>Ejura White</b>	Southern Ghana (Transitional zone)	Small sizes, white with black eyes, longer to cook, tasty, high swelling capacity.	<i>Gari &amp; beans, aboboi, koose, waakye, tubani, stew</i> ; mostly for domestic & commercial purposes.
<b>Ejura Red</b>	Southern Ghana (Transitional zone)	Smaller sizes, shades of red and brown with black eyes, longer to cook, tasty, high swelling capacity.	<i>Apprepensa, gari &amp; beans, waakye, tubani &amp; beans, stew</i> ; mostly just for domestic use.
<b>Red Beans</b>	Volta Region of Ghana	Smaller sizes, shades of red and brown with black eyes, longer to cook, tasty, high swelling capacity.	<i>Apprepensa, gari &amp; beans, waakye, tubani &amp; beans, stew</i> ; mostly just for domestic use.

The foreign varieties were popular for a number of reasons. These included post-harvest cleaning, treatment and packaging that enhanced the quality of grain legumes, shorter cooking time, large grain size, good taste and year-round availability (Table 3.2, Characteristics). These foreign varieties could also be used for common food uses and for the preparation of 'national dishes' (see Table 3.2, Popular Dishes), which may imply a strengthened competitive position of the foreign varieties in regard to local varieties. An

exception is the preparation of *Apprepensa*, a common, nutritious meal for weaning children as well as a regular adult dish, prepared from roasted maize and cowpea flour and for which primarily *red coloured local varieties* are used. Table 3.2 shows the foreign and local cowpea varieties found on the market during the survey period and the popular dishes prepared from them.

### *Ranking of consumer preferences*

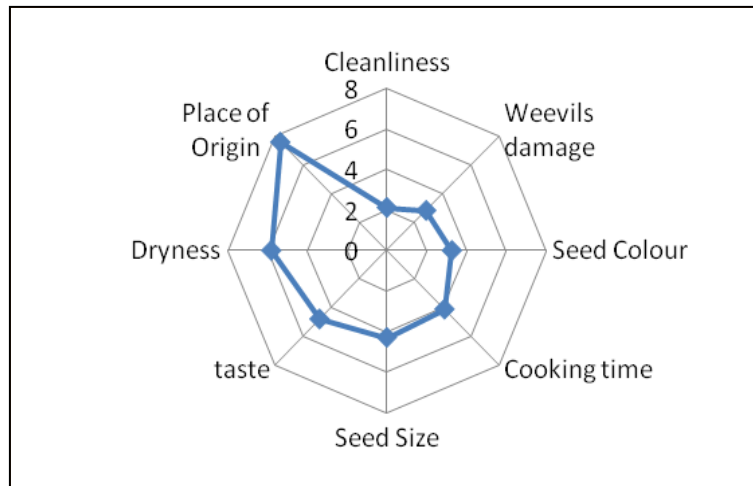
Analysis of consumer preference was made by establishing three sets of rankings, one for the traders and two for consumers. At the trader level, consumer preferences as perceived by the people selling cowpea were sought, while at the consumer level, the purchasers of cowpea, the consumers themselves, ranked their preferences (through one-to-one interviews). Results of the inquiry into consumer preferences as ranked by traders are presented in Table 3.3. The pooled (all markets) traders' ranking of consumer preferences was as follows, in decreasing order of importance: cleanliness (stone free and no dirt), colour (white beans), easy to cook, tasty, size (large to medium), less weevil damage, dryness (well dried beans) and place of origin. In Kumasi, traders perceived the taste of cowpea when cooked to be the grain characteristic most preferred by consumers. However, taste was ranked fifth in Accra, with traders here of the view that the taste of cowpea grain can only be ascertained when boiled or processed. Other than this difference, which had the effect of leaving taste in fourth place overall, there was a striking consistency in the results from the two cities, suggesting that the ranking can be generalised over as representative of a wide area (of urban localities), at least for the southern part of Ghana, and perhaps nationally and beyond.

**Table 3.3** Consumer preference as perceived by traders interviewed

Ranking	Accra	Kumasi	Pooled
1	Colour	Taste	Cleanliness
2	Cleanliness	Cleanliness	Colour
3	Cooking time	Colour	Cooking time
4	Size	Cooking time	Taste
5	Taste	Size	Size
6	Weevil damage	Weevil damage	Weevil damage
7	Dryness	Dryness	Dryness
8	Place of origin	Place of origin	Place of origin

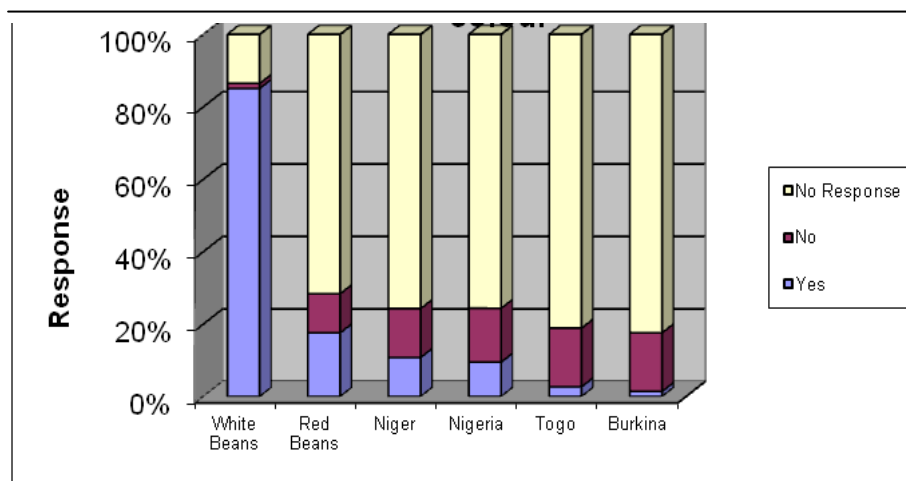
The rankings given by the consumers themselves for the same eight cowpea characteristics, with the most important rated 1 and the least 8, were averaged out to provide a single scale. The mean statistics for consumers' preference ranking responses were cleanliness (2.1), weevil damage (2.8), colour (3.3), size (4.3), cooking time (4.0), taste (4.8), dryness (5.8) and place of origin (7.6). These were plotted on a radar, or spider, diagram, which displays values

relative to a centre point (Fig 3.2). The axes are scaled from 0 to 8, with the least value being the most important, so the closer a characteristic ranking is to the centre (the zero point), the higher the preference, and the characteristics are ordered by ranking in clockwise fashion, producing a spiralling effect. Consumer preference ranking was similar to perceived preferences by traders except for weevil damage which was ranked 6th by traders and 2nd by consumers. This could possibly mean that traders did not hold the grain for long enough for weevils to become a problem or that they had some means of controlling the weevil damage. Either way, it would appear that they tended to overlook its importance for consumers, and that other than this, the traders' (indirect) ranking was largely confirmed by the (more direct) method of just asking the consumers.



**Figure 3.2** Consumer ranking of cowpea grain characteristics

Even more directly, perhaps, consumers were asked to simply state their preferred cowpea variety by specifying either place of origin or colour. Previous findings were again confirmed, with consumers stating their preferred choice as bean colour-based (white) (Figure 3.3). It also turned out that all the foreign cowpea varieties (Niger, Nigeria, Togo, Burkina) were all shades of white. There was not a large difference in consumer preference ranking among these foreign varieties. Consumers did not respond when asked whether they preferred a particular variety because of the place of origin. The consumers were more concerned about the grain quality characteristics rather than the origin of the cowpeas. Foreign cowpea varieties thus seem to be preferred because of their grain characteristics.



**Figure 3.3** Consumer preference in reference to place of origin and colour



Table 3.4 presents categories of comments generated from group discussions among traders and consumers. This complements the information generated from one-on-one interviews. The table shows that useful inferences can be drawn from reflecting on comments by both RSGs. First, *colour preference* could be linked to hardness of bean coat and cooking time. The red bean coat is hard and therefore difficult to cook. Given the fact that a growing number of urban consumers are seeking for convenience foods, it would seem that this issue of cowpea seed colour, as related to ease of cooking, should be seriously considered in variety development processes, especially if the aim of developing improved cowpea variety is to sell on the Ghanaian market. Although, consumers confirm the cultural significance of the red variety as used for typical local dishes in households, the need for quicker food preparation in the contemporary urban settings is gradually gaining in significance over cultural importance. The question then is do we breed just for white, or for both white and red, or for a dual purpose variety that cooks faster and still maintains its red colour appeal? This question relates to the investigation of breeding (Chapter 4).

A second inference to be drawn from the group discussions as collated in Table 3.4 is that both traders and consumers commented on cleanliness as a pointer to the importance of post-harvest handling of cowpea grains. In other words, not only are inherent issues that can be tackled in breeding are deemed important: equally important if local farmers are to better access their domestic market is the issue of *post-harvest handling*. Unfortunately, practical restraints have prevented this thesis from looking further into post-harvest issues, which might be an area for future research. Post-harvest handling (cleanliness) is clearly one of the single-most important factors influencing the high preference for foreign over locally produced cowpea. The general impression among traders and consumers is that locally produced cowpea is not well dried, easily gets weevil infestation, that there are a lot of stones and it is not well packaged, as opposed to foreign cowpea that is, conversely, well dried and sorted, treated against weevils and well packaged. Traders and consumers alike made remarks indicating that locally produced cowpea varieties may improve their competitive position when these post-harvest issues are resolved.

Thirdly, based on their experiences of selling patterns over the years, traders perceive that some food processors (food vendors) prefer small sized cowpea grain because this has *high swelling capacities*, which can increase their profit margins. This was corroborated by the preferences indicated by processors at the production level (Chapter 2). Further interactions with Ghanaian breeders suggested that extremely large cowpea and fast cooking varieties from Nigeria could probably have been subjected to a pre-heat treatment, but this has not been proven. Traders in Ghana confirmed that this particular Nigeria-originated cowpea variety attracts the highest price premium and is not generally affordable for the larger Ghanaian populace, especially to food processors needing to make a profit (see Langyintuo et al. 2003).

**Table 3.4** Comments on grain characteristics by cowpea traders and consumers

Grain Characteristic	Traders	Consumers
<b>Colour &amp; Cooking time</b>	<p>White cowpea grains are preferred over red because red beans have hard coats and are difficult to cook.</p> <p>For domestic purposes, short cooking time variety is most preferred.</p> <p>The Togo cowpea variety sells faster because it is less expensive, cooks faster and is tasty.</p>	<p>Each colour is good for a specific use.</p> <p>Red cowpea varieties are hard to cook and separate after cooking</p> <p>White cowpea varieties cook faster, and shorter cooking time cowpea varieties are preferred.</p>
<b>Cleanliness</b>	<p>Buyers prefer cleaner cowpea varieties, shorter cooking time and high swelling capacity</p>	<p>Prefer clean, weevil free and stone free cowpea.</p> <p>Prefer clean high swelling capacity cowpea varieties.</p>
<b>Size</b>	<p>Large sized beans are preferred by consumers who want to use cowpea for domestic purposes, so these attract the highest premium.</p> <p>Some food vendors like small size grains because they have high swelling capacity.</p>	<p>No comments</p>
<b>Local vs. Imported</b>	<p>Ghana cowpea is difficult to sell because of high presence of (competition from) foreign materials; need to sort a lot before selling.</p> <p>Locally produced cowpea is not common on the southern markets three months after harvesting due to storage problems.</p> <p>Locally produced cowpea is not too popular these days.</p> <p>Locally produced cowpea is not well dried, easily infested by weevils, there are a lot of stones and it is not well packaged.</p> <p>Foreign cowpeas are well sorted, treated against weevils and well packaged.</p> <p>The price of cowpea is mostly affected by exchange rates, since significant proportion of beans found on these markets are sourced from outside Ghana.</p>	<p>Prefer imported cowpea because it is tasty.</p> <p>Niger cowpea is tasty but has low swelling capacity.</p> <p>Nigeria cowpea cooks faster and is very tasty but very expensive.</p>
<b>Seasonality of sales</b>	<p>Cowpea sales increase during the plantain season (because a meal of cowpea stew with fried plantains is popular in the south), and also when senior high school is in session for school feeding.</p>	<p>No comments</p>

*Price differences among cowpea varieties*

Foreign cowpea varieties were less expensive than the local ones, with the exception, as mentioned, of the cowpea from Nigeria, which was expensive but also attractive in terms of cleanliness, cooking convenience, white colour and large grain size. The price per kilo of cowpea from Nigeria (Lagos) was GHC 2.0/kg. The average price per kilogram of other cowpea grains on the Ghanaian markets surveyed originating from Niger, Burkina and Togo cowpea grains were GHC 1.4, GHC 1.2, and GHC 1.3 respectively as compared to GHC 1.4

– 1.5 per kilogram for Ghanaian varieties (Bawku and Ejura Red, 1.5; Ejura white, 1.4) (Table 3.5).<sup>15</sup>

Referring to the market survey results showing foreign varieties to be less expensive than the local, except from Nigeria (Lagos) due to its specific characteristics, studies by Zannou et al. (2004) in Benin and Faye et al. (2002) in Senegal also reveal a positive relationship between cowpea grain quality characteristics (as perceived by buyers) and price. Whereas buyers pay a premium for large and white beans, a discount price was paid for other bean colours and weevilled grains in some districts in Benin and Senegal. According Mishili et al. (2007, 2009), the relationship between grain colour and pricing varied across different regions. Again, research results about cowpea supply and demand in West and Central Africa indicate that grain characteristics – such as seasonal supply, size, colour and the level of insect damage of the grains – explain between 63 and 97 percent of the price variability (Langyintuo et al. 2004; Murdock et al. 2003). Nevertheless, from the consumer preferences established in this survey, it is important to note that consumer preferences were based on the desirable qualities, present mostly in the foreign cowpea varieties and not necessarily related to price differences. This supports the relevance of investigating the qualities preferred by consumers and whether these qualities can be incorporated in the breeding of new local cowpea varieties.

**Table 3.5** Average market price of cowpea varieties on surveyed markets<sup>16</sup>

Market	Average Market Price (GHC/Kg)					
	Niger	Togo	Burkina	Bawku red/white (Ghana)	Ejura red (Ghana)	Ejura white (Ghana)
<b>Accra</b>						
Mallam Atta	1.3	1.3	1.2	1.2	-	-
Nima	1.3	1.2	1.1	1.1	1.4	1.2
Makola	1.6	1.5	-	2.5	2.5	1.7
Madina	1.7	1.3	1.3	1.6	2.5	-
<b>Kumasi</b>						
Alabar	1.3	-	1.3	-	1.0	-
Central	1.3	-	1.3	1.0	1.2	-
Anwona	1.5	-	1.3	-	1.5	1.3
Anloga	1.4	-	1.3	1.3	1.4	1.5
<b>Overall</b>	<b>1.4</b>	<b>1.3</b>	<b>1.2</b>	<b>1.5</b>	<b>1.5</b>	<b>1.4</b>

<sup>15</sup> GHC: Ghanaian cedi. The dollar exchange rate as of April-June 2009 was US\$1:GHC1.2.

<sup>16</sup> Cowpeas from Nigeria were sold at GHC2.0/kg at almost all the visited markets selling Nigerian cowpeas.

### *Morphological characterisation*

In order to investigate the extent of variation among different cowpea varieties found on the markets surveyed, forty-seven (47) cowpea accessions were collected from the traders on the various markets and morphologically characterised by the breeder in TELFUN West-African research team, using Genstat Discovery Edition 3 software. The samples were subjected to Hierarchical Cluster Analysis based on seed characteristics including seed shape, width, length, thickness and weight, seed crowding and splitting testa texture and attachment, and eye pattern and colour. These characteristics were selected also in relation to consumer preference characteristics (above). For example, morphological characteristics, such as testa texture, seed width and seed length, are related to cooking time. The goal of clustering was to join the 47 different samples collected from the markets into some meaningful groups using a measure of similarity in such a way that when varieties belong to the same group they have a maximum degree of same set of characteristics which can be meaningful for breeding purposes.

In the morphological characterisation, the clusters were formed based on the traits used, which were the seed characteristics that came up strongly in consumer preference ranking, both by traders and by the consumers themselves. Representing a particular set of traits, each cluster is unique. The members of each cluster at a given similarity coefficient are said to be similar. The implication for breeding is that a variable number of traits could be selected to create a cluster, as desired. This would be done when there is a large germplasm to work with; hence the need to cut down the size. This is very important when it comes to plant genetic resource conservation after undertaking an extensive sample collection. Ultimately, it is molecular characterisation that truly shows the actual similarities, when very good markers for the crop are identified.

Using Jaccard's nearest neighbour method of clustering the 47 samples collected at the markets surveyed, nine major groups or clusters were derived at a 70% level of similarity. At this level, six clusters consisted of only one accession while the rest had four, five and even twenty eight accessions. The characterisation confirmed the morphological differences among the samples collected. As mentioned this was important for the plant breeder to understand which of the collected cowpea samples can be grouped into clusters for a meaningful and workable basis for breeding purposes. However, for the social scientific part of the morphological characterisation, the study focused on investigating whether the 47 samples were indeed different varieties and also whether the samples labelled with foreign names were indeed foreign. To a large extent, results from the morphological characterisation also supported the established consumer preference ranking in terms of seed characteristics. This signifies that consumers are indeed interested in specific seed (bean) quality characteristics of cowpea varieties..

### 3.4 Concluding remarks

The influx of foreign cowpea on the Ghanaian market from Niger, Burkina Faso, Nigeria and Togo raises the question – stimulated by the food sovereignty debate with its emphasis on the relevancy of locally grown products – whether that influx could gradually crowd local cowpea producers out of the local market. However, a reverse scenario can also be considered, of *how locally improved varieties can facilitate domestic market access on the part of resource-poor smallholder farmers*. From the survey findings on consumer preferences as perceived by the traders and by the consumers themselves, it was evident that primarily, the desirable qualities associated with cowpea varieties were most relevant for the social meanings ascribed to the preferred varieties, which, secondarily, have themselves become identified by supposed place of origin as local or foreign varieties. Moreover, both the range and popularity of varieties and the practice of mixing different varieties may be interpreted as illustrating that the real issue at stake is that of finding the desirable mixture of traits preferred by the consumers. Indeed, it may be precisely the observed cowpea variation on the markets that can become an important local resource, insofar as it gives Ghanaian breeders the opportunity to exploit the range of foreign, local and improved varieties as a gene pool to develop further new varieties which can compete favourably with the original foreign varieties that have been come to dominate market share.

Therefore, I position the role of consumers and traders in variety development as equally crucial to that of farmers and propose an involvement of consumers/traders alongside the farmers in the establishment of new participatory cowpea breeding programs. The degree of participation of traders and consumers and stages in the process in which they are involved (especially the stage at which they enter, see Chapter 4) will definitely affect breeding outcomes in terms of marketability of improved varieties (Sperling 2001). The issue of cleanliness as the most important cowpea characteristic in consumer's preferences – which is also related to the extent of weevil damage – can be addressed if varieties with high storability and less susceptibility to insect damage are selected for during breeding. Post-harvest handling also needs to be separately examined with the aim of maximizing consumer acceptability, which clearly can be expected to require trader involvement (and again, ideally at all or most stages of the process).

The involvement of consumers and traders in the participatory plant breeding program may help to reverse the trend toward the crowding out of local varieties due to a better attuning of variety development to local demands. By introducing the consumer preferences into breeding programs alongside the various producer variety preferences (from farmers, Chapter 2) the newly developed varieties may become better adapted to the preferences of RSGs as well as local climatic edaphic conditions. As indicated by Mishili et al. (2007), a better understanding of consumer/trader cowpea preferences is essential for the market development of locally improved varieties; I suggest that these consumer preferences for specific cowpea variety characteristics may have implications for cowpea breeding activities in Ghana, which may in turn impact on the access that small-scale cowpea farmers are able to gain to their domestic market. Arguably, the reason why locally improved cowpea varieties are becoming

unpopular in the Ghanaian market is partly because the approach to breeding has not factored in the multiple *interpretative meanings* of improved varieties for all (or at least sufficient) RSGs in the cowpea breeding network.

Combining the results from the research reported in Chapter 2 with those of the current chapter show that there are multiple meanings to what an improved cowpea variety ought to be among different RSGs. Farmers, processors and consumers in different, socio-economic, rural and urban contexts have different interpretations of the characteristics that should be aimed at in improved cowpea varieties. These differences in variety preferences at (smallholder) production and (household and market) consumption levels, need to be considered in (public, i.e. non-profit led) variety development efforts. This implies that the involvement of other, often neglected RSGs – smallholder farmers, processors, traders and consumers – in participatory variety development should become fundamental in forward planning. With this in mind, some of the constraints and possibilities for changing and extending the participation of various RSGs in cowpea breeding and variety development in Ghana will be discussed in the next chapter.

## CHAPTER FOUR

### Social (critical) construction of technology: the case of cowpea development in Ghana

#### 4.1 Introduction

This chapter investigates the past (and present) cowpea breeding activities in Ghana in relation to the level of participation of both international and local RSGs, the resource power imbalance among them and its influence on the variety development process. Using the concept of *technical code*, the composition of the cowpea breeding network is discussed alongside the socio-cultural assumptions underlying the development of cowpea variety designs, and the need to include other RSGs to take advantage of the wide variations in interpretative flexibility in cowpea variety designs. In this study, the cowpea variety (technology) development process is critically scrutinised using the technical code concept to reveal the socio-cultural assumptions and resource power imbalances among the RSGs in the various stages of variety development process and to explore the endogenous possibilities for rewriting the codes in variety designs to better reflect local specific needs. This has been inspired by the proposal made by Feenberg (1999), that embedded in the ‘*black box*’ of technology designs are technical specifications geared towards specific social goals in codes which can be revealed for re-construction possibilities (see also Ruivenkamp 2005, 2008b, Feenberg 2005, 2010, and Vroom 2008).

Simply put, codes are sets of societal norms and values inscribed in ‘secrecy’ within the technical designs. However, as Feenberg and Ruivenkamp (ibid) explain, these codes can also be reconstructed, so that the resulting technical products play different roles in alternative social systems. In this chapter, I argue that Ghanaian cowpea variety designs can be reconstructed through the incorporation of societal values grounded in the concept of food sovereignty, with the designs of varieties on the basis of the social meanings ascribed to cowpea by the relevant, but neglected, social groups of small-scale farmers and consumers, which, in the case of the former (and through the latter) implies an emphasis on the local supply of food and mitigation of rural poverty and hunger. The incorporation of the norms, values and perspectives of smallholder producers (and processors) and cowpea (product) consumers into the design of new cowpea varieties may challenge the political bias in the technical codes which have been related towards the values of the dominant actors primarily, the larger commercial growers, and research developers oriented to the needs of larger scale commerce and supported by those state agencies which function from the framework of global neoliberalism. Indeed, the use of the technical code concept aims at uncovering such inherent biases and indicates opportunities for reconstructing the technical designs through a methodological approach of critical-constructivist research.

The need to undertake this critical constructivist investigation through the lens of technical codes has become crucial given the gradual crowding out of smallholder cowpea farmers

from their domestic market as a result of the influx of foreign cowpea on the Ghanaian market (Chapter 3). This chapter focuses, therefore, on cowpea variety (technology) as a key production resource that can facilitate small-holder farmers' access to their domestic market and re-link local production and consumption for enhanced food sovereignty. To this end, the development trajectory of improving local market-variety relations requires a critical reflection on how past (and present) cowpea breeding activities in Ghana have been organised, which power relations among RSGs exist and how these power imbalances affects the variety development process in order to identify possibilities for a reconstruction of the *codes* in the development of new variety designs. The broad research question for this chapter therefore is:

*How are past cowpea breeding activities in Ghana organised and to what extent have cowpea breeding programmes responded to domestic market demands?*

The sub-research questions are:

- How has cowpea variety development been *organised* in Ghana?
- To what extent have improved varieties addressed the *social needs* of the relevant social groups of small-scale farmers (and processors) and consumers?
- What are the possibilities for *reconstructing* cowpea variety designs to facilitate smallholder farmers' market access for enhanced food sovereignty?

#### *Methodology and data collection methods*

In order to address these questions, the methodological approach of critical-constructivist research is utilised. This involved continuous but critical reflection on Ghana's cowpea variety development through the conceptual lens of *technical code* and *relevant social group*, investigating the existing social organisation and power relations in the cowpea variety development process. It also implied a quest to identify possibilities for reconstructing the technical code in cowpea variety development and the involvement of still neglected RSGs in that development process by constantly reflecting on the empirical findings and critical ideas from food sovereignty perspective.

A combination of data collection methods were used in this critical-constructivist research methodology. Using the technical code as an analytical tool, a *retrospective view* of the past cowpea breeding activities in Ghana was investigated through expert interviews, and formal and informal discussions as well as review of cowpea variety development project documents for the period 1990-2010. A total of 30 experts interviews were conducted between December 2009 and April 2010 involving one-on-one interactions with a range of individuals and institutions, including breeders, extension officers, university lecturers from the Department of Crop Science and experts at the Biotechnology Centre in the University of Ghana, officials of the Ministry of Food & Agriculture (MoFA), seed growers, experienced farmers with indigenous knowledge of breeding, crop scientists, policy makers, researchers at the Plant Genetics Resource Centre and members of National Varietal Release Committee



(NVRC). A checklist detailing semi structured questions on cowpea breeding activities, varietal release process and impact of cowpea breeding programmes was used as interview guide. Back-and-forth confirmation related to interviews and other issues that came up during analysis and thesis writing were also conducted through informal discussions. In addition, the objectives of breeding set at the conceptualization stage, the roles and responsibilities of RSGs involved in the variety of development process were *examined at the point of practice* through participatory observation of breeding activities conducted in 2010.

This critical-constructivist research methodological approach is somewhat similar to technography, which also focuses on technology-society interactions in technological systems and the involvement of social actors in such systems (Almekinders 2011: 207-216; Jansen & Vellema 2010: 169-177, Kissawike 2008, Zannou 2006). However, in a critical-constructivist research methodology approach the emphasis is more on reconstructing the technology-society interactions and the involvement of other actors in an iterative manner than exclusively on describing these relations. The critical constructivist approach searches for opportunities to open new spaces for manoeuvre and possibilities to reconstruct variety designs. This also involves taking on board criticisms and concerns by people in the field, and redesigning the research methodology in order to ensure data quality. Primarily, a critical constructivist research methodology pays attention to reflections on the social relevance of empirical findings, most particularly in relation to social contextualities and opportunities for improvement within the society (Alvesson & Skoldberg 2009, Puente-Rodriguez 2010). Here, the emphasis is on the interpretation rather than representation of reality on the basis of data collected.

### *Chapter outline*

This chapter will first show how cowpea variety development has been *organised* in Ghana over the past twenty years (1990-2010), in reference especially to the multiple and diverse interpretative meanings of cowpea variety among RSGs in the cowpea network (as presented in Chapters 2 and 3). Second, I explore the extent of participation by local RSGs in the variety development process and how improved varieties *reflect the needs of local RSGs* as well as the power relations among international and local researchers in the variety development processes. Third, I explore the possibilities of *re-constructing* cowpea variety design for enhanced market access by small-scale farmers using the technical code concept. This is aimed at suggesting ways of reversing the gradual crowding out of smallholders from the Ghanaian market, which is largely due to the quality characteristics of locally improved cowpea varieties (Chapter 3).

## **4.2 Cowpea varietal development activities in Ghana**

Before discussing the social organisation of cowpea breeding, I first give a brief historical account of cowpea varietal development programmes in Ghana over the past twenty years. Since the 1990s, several research institutions have been involved in the different phases of Ghanaian cowpea variety development, with international institutions/research centres in particular leading the formal organisation of cowpea variety development. These have set

scientific breeding standards for the purposes of replicability and validity of results, with the local researchers who facilitate the breeding programmes in Ghana obliged to meet these standards. The international institutions involved in cowpea variety development in Ghana include the Consultative Group on International Agricultural Research (CGIAR), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the International Institute for Tropical Agriculture (IITA). IITA leads global research on cowpea and has released improved varieties to about 68 countries worldwide, including Ghana.<sup>17</sup> The international organisations conduct upstream breeding programmes aimed at developing a wide range of high yielding varieties for further adaptive research in locality specific regions.

The local research institutions involved in cowpea breeding in Ghana include, the Savanna Agricultural Research Institute (SARI) in northern Ghana, the Plant Genetic Resources Centre (PGRC) and the Crops Research Institute (CRI) in southern Ghana. All these institutions operate under the Council for Scientific and Industrial Research (CSIR) and collaborate with universities, advanced laboratories and the above-mentioned international centres.

Research institutions in Ghana received various forms of funding for cowpea breeding activities over the past two decades. For example, cowpea breeding activities were conducted under the Ghana Grains and Development Project (1990-1996), funded by the governments of Ghana and Canada. Breeding activities have included *hybridization* and *evaluation of early generation breeding lines*– received from IITA – aimed at bruchid and aphid resistance. Several crosses have been made to generate F1 and F2 populations for studies of inheritance of pest resistance (to aphid and thrips), variety testing at different agro-ecological zones in Ghana, and screening of cowpea lines for intercropping compatibility with maize and cassava on farmers' fields. The *objective* of these breeding activities was primarily to develop *pest/disease resistant cowpea varieties with high and stable yield as well as early-medium maturation*. Under this initiative, improved technologies on cowpea production with 5-10 times the potential yield of landraces were developed and disseminated to farmers in the major agro-ecological regions (Dankyi et al. 2006: 25-34).

During the years 1998 to 2003, the cowpea improvement programme –under the National Agricultural Research Project/Food Crops Development Project and Agricultural Services Sub-Sector Investment Program (AgSSIP) with funding from the World Bank – conducted research into *identified priority areas with stakeholders*. Apparently, the establishment of breeding priority areas has been largely influenced by the need to increase yields for growing populations as well as to develop insect pest and disease resistant varieties. Some of the breeding activities conducted involve multi-locational yield trials of exotic lines from IITA, screening for parasitic weed resistance (to *striga gesnerioides*), genetic mapping of early maturity genes in cowpea and seed multiplication. Basically, the objective was to develop *high and stable yield, early and medium maturing* varieties of cowpea which combined resistance to pest/diseases and seed acceptability.

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<sup>17</sup><http://www.iita.org>

In general, IITA research has focused on the development of high-yielding varieties that are early or medium maturing and have consumer preferred traits related to seed size (large) and colour (IITA 2009). Some of the improved varieties also have resistance to major diseases, insect pests, nematodes and parasitic weeds. These improved cowpea lines are distributed to collaborating research institutions in the various sub-regions, including Ghana, under the Cowpea International Trials (CITs) programme for downstream breeding activities. The collaborating regional-specific research institutions are ultimately responsible for up-scaling and out-scaling of varieties (technologies) developed from the upstream breeding activities of the international research institutions for maximum development impact. In 2009, IITA reported a five-fold plus increase in worldwide production over 35 years of collaborative research, with gross yields rising from 1.2 MT to more than 7.5 MT (in millions) per year (IITA 2009). However, the local improved cowpea varieties are currently not performing so well in the Ghanaian markets (Chapter 3) and there is thus an urgent need to investigate the social organisation of cowpea breeding activities in Ghana so as to suggest ways of manoeuvring for improvement. An important target is the development of varieties that have traits attuned to local cropping systems, the ecologically sustainable, that can also sell on the Ghanaian.

In 2005-2008, the University of Riverside, California USA supported cowpea breeding conducted by SARI which aimed at addressing production constraints through crosses among genotypes within SARI germplasm and exotic materials. Under this breeding program, SARI developed *six improved varieties of cowpea* with varied adaptive traits attuned to predominant and emerging cropping systems in northern Ghana. A sensitization workshop on a variety development programme was organised by CRI in Brong-Ahafo Region, and a variety release workshop conducted in Ashanti Region in 2002. The sensitization workshop aimed at educating stakeholders (mainly local researchers, farmers and agricultural extension officers) on the objectives of a new cowpea breeding research project in CRI. As indicated in Table 4.1, the objectives of this project were actually set by international research institutions leading it, with the workshop local stakeholders just being informed about the project objectives and discussions among participants focusing on how to achieve these objectives during implementation.

Also in 2010, the Ghana/Benin Telfun breeder organised on-farm demonstration sessions for cowpea farmers. This was done as part of the participatory breeding activities aimed at attuning cowpea variety development to the needs of the local network. The difference with the Telfun approach, however, is rather clear, since this emphasises the setting of breeding objectives with local stakeholders in the field through a coordinated network study (see Chapter 1, Methodology) and also communication of information to the breeder (on the cowpea diversity at Ghanaian markets) for use in the development of a breeding programme.

Over the twenty-year period under review, therefore, breeding objectives have been focused basically on the technical functionalities of cowpea variety design (yields, maturation, resistance to pests and diseases and drought tolerance), along with acceptable seed characteristics. Cowpea breeding activities in Ghana have been limited to the evaluation and selection of varietal designs developed at international breeding centres, with activities in the

country generally intended to attune exotic lines to the local bio-environment, with the help of farmers. As will be discussed (below), local farmers provide the germplasm that is used as the raw material for the development of these exotic lines upstream, at the international research centres. Their contribution to the varietal development process, however, is goes essentially unrecognised in monetary terms (Bush 1996, Kloppenburg 2010, Coleman & Reed 2011, Prathapan & Rajan, 2011); that is, germplasm is seen as a common good for which no payment is necessary.

Since 2000, there has been a slight improvement in the development of cowpea variety designs with respect to the involvement of local researchers in genetic improvement activities (Adu-Dapaah 2008, Asare et al. 2010), a situation that can be improved further through increased local investment in breeding and also through donor support for local capacity building in breeding infrastructure and techniques. Also, as indicated by Osslon (2009), international donors need to fund essential conditions for research in local environments (see below). Overall, the adjustment in breeding objectives in 2000 involved a move towards highlighting the relevancy of the market value of improved cowpea varieties. However, key activities conducted did not give any indications as to how the market competitiveness of improved cowpea varieties were pursued; with the exception of farmers, other end-users of improved cowpea varieties such as small-scale processors and consumers were not involved in the breeding activities; and farmers were assumed to be consumers, with no distinction made between the different categories of farmers. A summary of objectives and key breeding activities extracted from available reports during the period under review (1990-2010) is presented in Table 4.1.

**Table 4.1 Overview of cowpea breeding activities in Ghana (1990-2010)**

Breeding Report	Breeding Objectives and Key Activities
<p><b>CRI Annual Report 1990-1996, under Ghana Grains Development Project</b></p>	<p>Development of high and stable yielding, early and medium maturing cowpea varieties that combine resistance to major insect pests and diseases with acceptable seed characteristics. In this project, early generation breeding lines with high insect pest and disease resistant received from IITA were evaluated. Specific activities included the following:</p> <ul style="list-style-type: none"> <li>(i) Several crosses made to generate F1 and F2 populations for studies on inheritance of resistance to aphid and thrips; crosses made to transfer aphids and thrips resistance into varieties susceptible to these insects</li> <li>(ii) Varietal testing at different agro-ecological zones in Ghana with farmers</li> <li>(iii) Screening of cowpea lines for intercropping compatibility with maize and cassava with farmers</li> <li>(iv) Production of breeder seeds.</li> </ul>
<p><b>National Agricultural Research Project (NARP) 1998</b></p>	<p>Development of high yielding cowpea varieties of different maturity groups for northern and southern Ghana. Specific activities included the following:</p> <ul style="list-style-type: none"> <li>(i) Determination of yields of early maturing cowpea varieties</li> <li>(ii) Determination of the optimum planting date of cowpea</li> <li>(iii) On-farm testing with farmers</li> <li>(iv) Production of breeder seeds.</li> </ul>

<p><b>CRI Annual Report 2000, under National Agricultural Research Project</b></p>	<p>Development of high yielding, early and medium maturing cowpea varieties that combine resistance to insect pests and diseases as well as with acceptable seed characteristics. Specific activities included the following:</p> <ul style="list-style-type: none"> <li>(i) Introduction and evaluation of exotic germplasm</li> <li>(ii) Genetic improvement involving characterization of local landraces and some exotic germplasm collections using biochemical/molecular genetic techniques</li> <li>(iii) Use of molecular markers to measure extent of genetic diversity among genotypes studied</li> <li>(iv) Variety testing with farmers</li> <li>(v) Breeder seed production / seed increases of superior lines.</li> </ul>
<p><b>Progress Report on Cowpea Improvement Program in SARI, under Food Crops Development Project/ AgSSIP (2002-2003)</b></p>	<p>Two broad objectives: (1) Development of suitable cowpea varieties to address constraints such as low yields, drought, insect pest and disease infestation; (2) Development of early maturing varieties adaptable to various agro-ecologies and farming systems and of high market value. Specific activities included the following:</p> <ul style="list-style-type: none"> <li>(i) Multi-locational yield trails of lines developed at IITA with farmers</li> <li>(ii) Screening for resistance to <i>Striga gesnerioides</i></li> <li>(iii) Genetic mapping of extra-early maturity genes in cowpea</li> <li>(iv) Breeder seeds supplied to foundation seed growers</li> <li>(v) Enhancing farmer accessibility to improved varieties by strengthening farmer-seed grower linkages.</li> </ul>
<p><b>SARI Varietal Protocol submitted to the NVRC, under the Challenge Program on Water and Food PN6, 2005-2008</b></p>	<p>Development of cowpea varieties that are high yielding, susceptible to <i>striga gesnerioides</i>, insect pests and disease resistance. Other objectives included variety susceptibility to high night temperatures that reduce pod set and drought tolerance. Specific activities included the following:</p> <ul style="list-style-type: none"> <li>(i) Agronomic performance assessment through on-station and on-farm trials with farmers</li> <li>(ii) Evaluation of new varieties against existing standards/check variety selection of materials for release considerations</li> <li>(iii) Breeder and foundation seeds production</li> <li>(iv) Inspection by National Variety Release Committee (NVRC).</li> </ul>
<p><b>TELFUN Sensitization Workshop on participatory varietal development 2010, under PhD research project</b></p>	<p>Sensitization of stakeholders on a new project aimed at improving incomes and livelihoods through increased production and utilization of cowpea. Key activities included the following:</p> <ul style="list-style-type: none"> <li>(i) Identification of high yielding, disease resistant varieties for cultivation</li> <li>(ii) Farmer participatory variety verification and selection</li> <li>(iii) Promotion of improved production technologies through demonstration on farmer fields, field days, stakeholder discussions on varietal performance and farmer preference</li> <li>(iv) Seed multiplication</li> <li>(v) Training of farmers and extension agents.</li> </ul>

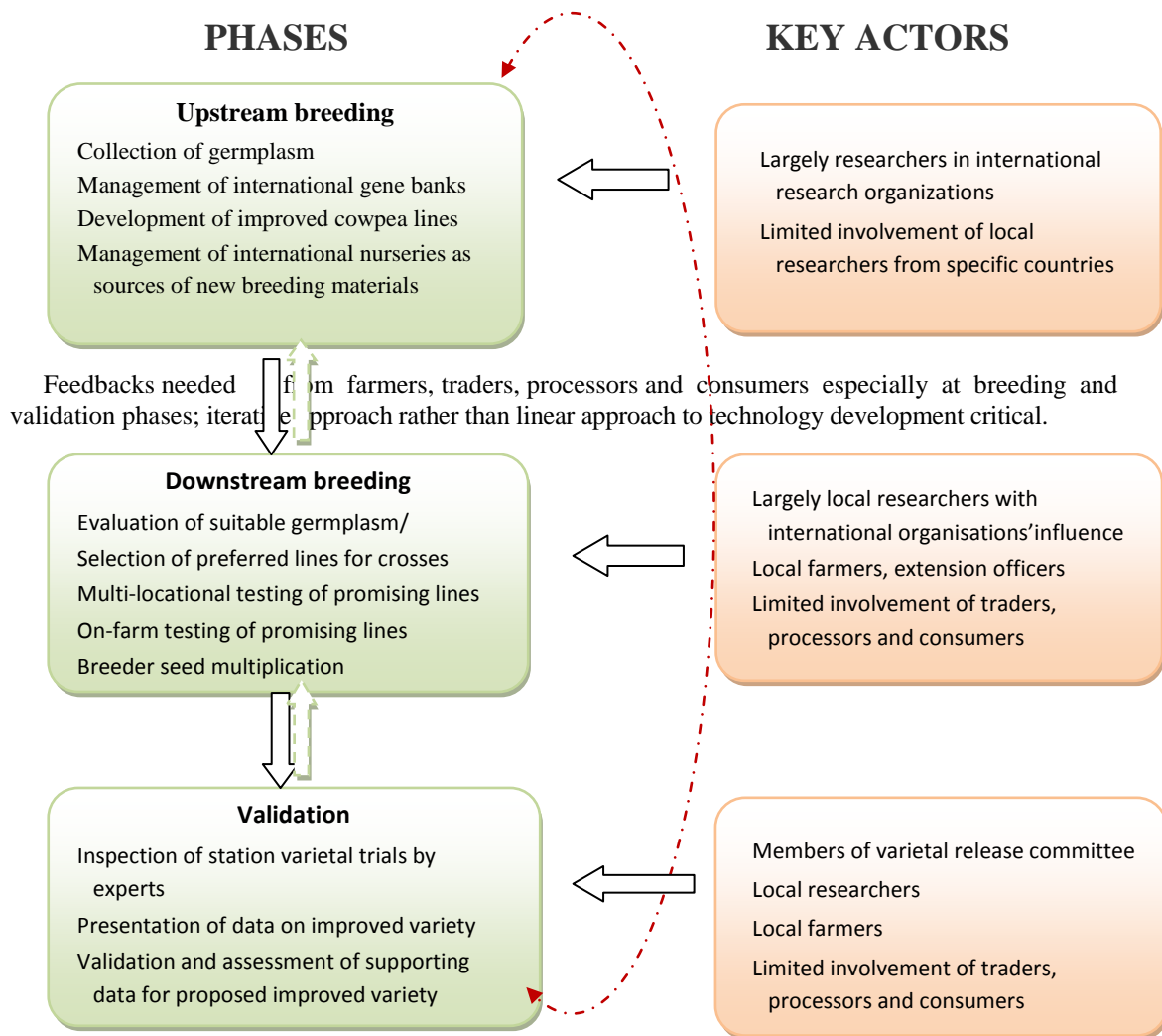
**Source:** Author's compilation from breeding reports<sup>18</sup>

<sup>18</sup>The 1999, 2001 and 2004 breeding reports were unavailable.

### 4.3 The social organisation of triple-phase cowpea breeding

Three breeding phases can be distinguished in the cowpea variety development process:

- (i) The *upstream breeding phase*, which in Ghana is mostly organised and governed by international researchers with rather limited local input;
- (ii) The *downstream breeding phase*, organised and executed by local researchers in collaboration with international researchers and with the participation of local stakeholders;
- (ii) The *validation and release phase*, organised by local researchers and stakeholders.



**Figure 4.1** Diagrammatic representation of phases and actors in cowpea breeding in Ghana

### *Up-stream breeding phase*

A core activity of the upstream breeding phase is the *collection of germplasm*. For example, IITA has a rich gene bank that holds germplasm and wild accessions containing cowpea genotypes collected over 100 countries.<sup>19</sup> Among the wide range of cowpea trait characteristics housed here are those for plant pigmentation, plant type, plant height, leaf type, photosensitivity, maturity, nitrogen fixation, fodder quality, heat and drought resistance, grain quality, and resistance to disease, pests (root-knot nematodes, aphids, bruchids, thrips) and parasitic weeds. Over the years, IITA scientists/breeders have tried to add genes for pest resistance into *improved cowpea breeding lines* as well as to selected varieties as recurrent parents for subsequent breeding activities downstream in various countries in the sub-region, including Ghana.

At this upstream breeding phase, the international breeding centres set *broad breeding objectives* – on the basis of the technical characteristics in the germplasm – sometimes with inputs from the National Agricultural Research System (NARS). These broad objectives include production gains, biodiversity enhancement, effective targeting of user needs, cost-effectiveness and community empowerment, depending on each particular programme focus. The international centres come up with several variety designs or exotic lines for further cowpea breeding development; through these lines, by setting the breeding standards and procedures that allow for comparison of field results across countries, they also influence the direction of decision making as well as the kinds of results and data required at the downstream breeding phase. A typical example is the international comparison of field results across countries and selection of sites for Cowpea International Trials (CITs).

The management of CITs in the local environment (downstream) takes place in close collaboration with these international breeders, allowing local researchers also to be involved in the collection of germplasm from local farmers and to select with farmers the advanced breeding lines from IITA that are to be adapted to local conditions in the downstream breeding phase. In short, there is a specific division of labour in the upstream breeding phase which largely take place at the international breeding centres where the conceptualization of variety development programmes is initiated.

At this upstream breeding phase, the involvement of local researchers is limited to the collection of germplasm from local farmers for the international gene banks. Although local farmers provide the germplasm needed for the variety development, they play a passive role. At this stage farmer participation can best be described as consultative (as in giving local germplasm) from a distance, not as collaborative or task sharing (see Sperling et al. 2001: 439-450). The germplasm collected from several countries including Ghana is used for advanced laboratory based breeding work carried out by the international research centres and aiming at the development of improved variety designs to be disseminated across various

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<sup>19</sup> The IITA gene bank holds the world's largest and most diverse collection of cowpeas, with 15,122 unique samples from 88 countries, including Ghana (<http://www.iita.org>, accessed March 2011). This international gene bank serves as a biodiversity resource pool for cowpea breeding.

countries. The technical characteristics in the collected germplasm are disconnected from their original contexts – they become *de-contextualized* – and subsequently used as anonymous raw materials for the development of improved exotic lines to be disseminated across countries. For the use of the collected germplasm to breed new lines the international centres set broad breeding objectives, indicating the goals assumed to be socially desirable and the technical specifications for realising these goals, and inscribe these technical and social functionalities in the development of improved variety designs. At this stage, the international breeders make a representation of the assumed social needs of local RSGs (what the international breeders think that local traders, processors and consumers consider desirable in an improved cowpea variety). The extent to which this representation is accurate is debatable; representation of these other end-users is woefully inadequate, I would argue (below).

In view of this specific organisation of the upstream breeding phase the question has to be posed of whether *stabilization or a degree of interpretative and design flexibility* can be realised in this breeding phase. The trend towards a *stabilization and closure* in the breeding programmes manifests itself through the dominant position and influence of the international breeding centres in setting the broad breeding objectives for the development of new improved cowpea lines. As mentioned, through the development and dissemination of the new exotic lines, these centres effectively determine the parameters of further development downstream. These parameters are quite wide however. The genetic engineering and manipulation performed in the upstream variety design process results in considerable variation of the cowpea trait characteristics that are then used for evaluation and adaptation in local environments. So, a trend towards *flexibility* is also present: the improved exotic lines are mostly breeding materials requiring selection and evaluation for local adaptation, distributed for further, location-specific breeding work carried out by national research institutions, as has occurred in Ghana.

Through the need for local adaptation, different variety designs emerge that show a wide variation of cowpea trait characteristics whose selection may be aimed towards specific technical and social goals. In other words, there is a constant interplay between the prescriptive standards and principles of the international centres and the opportunities for national research centres to engage with local concerns expressed through specifically adapted varieties. Although the empirical research has shown that the majority of the variety development projects implemented in Ghana during the twenty years were designed upstream, according to the international standards focusing on raising production (through productivity increase and pest and disease resistance) still the power of the international centres may be mitigated and even challenged downstream, by local initiatives focusing on other issues and characteristics.

#### *Downstream breeding phase*

At the downstream breeding phase, key activities include the evaluation of suitable germplasm, selection of preferred lines for crosses and the multi-locational and on-farm testing of promising lines for breeder seed multiplication (Fig.4.1). The on-farm multi-



locational testing of promising lines guarantees the participation of farmers in the downstream breeding phase. Decisions about which of the improved lines are to be selected for cowpea variety development among the wide range of design options (presented by the technology developers) is made by *local researchers in collaboration with farmers*. This is done in participatory variety selection (PVS) or participatory plant breeding (PPB) depending on the extent of farmers' involvement. This is the stage at which the *de-contextualized* exotic lines, developed in the upstream breeding phase are integrated back into a natural and social environment (*'re-contextualization'*). These improved cowpea designs or exotic lines contain the technical codes formulated by international research centres that ascribe the socio-cultural and technical assumptions underlying and incorporated into variety designs (below, 4.4).

Prioritization of breeding objectives (which are led by the international researchers) are firmed up at the downstream breeding phase through participatory stakeholder meetings and annual workshops involving mostly researchers, farmers, extensionists and NGOs working with farmer groups. Cowpea breeding programmes in Ghana during the period under review focused on the urgent needs and requirements for crop yield increases, resistance to pests and diseases and stress tolerance: the meanings constructed for improved cowpea variety upstream were essentially replicated by those constructed downstream, largely by technology developers with, to some extent, the farmers participating in breeding activities.

Concerning the social organisation of the activities in the downstream breeding phase, the research confirmed that most of the breeding activities during the period under review were conducted by local researchers (breeders) with farmers and other clients, such as extension agents, mainly through conventional breeding and participatory variety selection (PVS) techniques. In some cases, molecular tools were used to assess the genetic diversity of released and elite<sup>20</sup> lines. Farmers' roles and contributions to the practical breeding process have been identified through field observations as well as through analysis of documentation and reports on past breeding activities (Table 4.2).

The empirical findings show that farmers supplied inputs such as labour and sometimes their farms (land) for the breeding work, they shared their indigenous knowledge of breeding and gave information on their variety preferences and the trade-offs they were willing to accommodate among traits (e.g. yield, maturity, resistance levels). The farmers assisted in the selection of traits among competing options at this stage largely based on their experiences, as also witnessed during interactions with Telfun breeder and cowpea farmers in the field.

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<sup>20</sup> Elite lines: those considered the most promising breeding materials

**Table 4.2** Roles of Relevant Social Groups (RSGs) and Power Relations in cowpea breeding  
(Study period 1990-2010)

Study Period/Project	Roles of RSGs, their Power Relations and other Emerging Trends in Downstream Breeding
<b>1990-1996</b> <b>Ghana Grains</b> <b>Development Project</b>	<p>The following key observations can be deduced from the breeding documents:</p> <ul style="list-style-type: none"> <li>(i) International breeders provided variety designs in the form of exotic lines with explicit technical specifications (high yields, early maturing and disease/pest resistance); variety designs had implicit social meanings such as changes needed in social organisation of production and cost implications with external input requirements.</li> <li>(ii) Specific breeding activities (Table 4.1) conducted by local researchers with farmers and extension agents, but highly controlled by international breeders from a distance through set rules and regulations</li> </ul>
Study Period / Project	Roles of RSGs, their Power Relations and other Emerging Trends in Downstream Breeding
<b>1990-1996</b> <b>Ghana Grains</b> <b>Development Project</b> (contd.)	<ul style="list-style-type: none"> <li>(iii) No distinction made regarding types of farmers (commercial v subsistence) and their specific variety needs in setting breeding objectives</li> <li>(iv) No involvement of cowpea traders, processors or consumers</li> <li>(v) Impact assessment of improved cowpea varieties developed under the Grains Development Project limited to farmers; extent of adoption of improved varieties by farmers in 1995 assessed by Dankyi et al. (2006); less attention paid to the performance of improved varieties at domestic market level.</li> </ul>
<b>1998</b> <b>National</b> <b>Agricultural</b> <b>Research Project</b> <b>(NARP)</b>	<ul style="list-style-type: none"> <li>(i) Breeding objectives almost the same as specified in 1990-1996</li> <li>(ii) International breeders still playing dominant role in supplying already developed exotic lines and controlling breeding activities from a distance through rules and regulations</li> <li>(iii) Local breeders, farmers and extension officers involved in evaluation and selection of variety designs; selection driven mostly by the technical functionality of high yielding and early maturing varieties in relation to the bio-environment in Ghana</li> <li>(iv) Again, no distinction regarding farmers type and specific variety needs</li> <li>(v) Consumer preference not fully integrated into breeding objectives</li> </ul>
<b>2000</b> <b>National</b> <b>Agricultural</b> <b>Research Project</b>	<ul style="list-style-type: none"> <li>(i) Breeding objectives basically as specified in 1990-1998</li> <li>(ii) <i>Slight improvement in the development of cowpea variety designs with local breeders' involvement in genetic improvement</i>, but local capacity strengthening needed for such research</li> <li>(iii) Farmer involvement still limited to provision of local germplasm for upstream breeding; downstream, farmer roles limited to evaluation and selection of variety designs</li> <li>(iv) Acceptable seed characteristics mentioned in objectives but not specified in key activities conducted.</li> </ul>
<b>2002-2003</b> <b>Cowpea</b>	<ul style="list-style-type: none"> <li>(i) <i>Slight change in the breeding objectives to include market value of cowpea varieties</i>, but traders, processors and consumers not involved in the breeding process; farmers assumed to be consumers.</li> </ul>

<b>Improvement Program in SARI, under Food Crops Development Project/ AgSSIP</b>	<ul style="list-style-type: none"> <li>(ii) Role of international breeders unchanged (i.e. developing exotic lines for further breeding work downstream, thus effecting control from a distance).</li> <li>(iii) Farmer role in breeding unchanged</li> <li>(iv) Although breeding for market, still no distinction made regarding type of farmers involved in breeding activities.</li> </ul>
<b>2005-2008 SARI Varietal Protocol submitted to the NVRC, under the Challenge Program on Water and Food PN6</b>	<ul style="list-style-type: none"> <li>(i) Breeding work specifically targeting subsistence farmers in the Northern Region</li> <li>(ii) Improved cowpea varieties with specific food uses specified (<i>koose</i>, <i>waakye</i> and <i>tubani</i>)</li> <li>(iii) Roles of international breeders, local breeders and farmers unchanged</li> <li>(iv) Farmers involved in agronomic performance assessment through on-station and on-farm trials</li> <li>(v) NVRC inspects on-station and on-farm trials to check variety release requirements, but variety release requirements set against international standards; thus, even variety release significantly controlled from a distance.</li> </ul>
<b>Study Period / Project</b>	<b>Roles of RSGs, their Power Relations and other Emerging Trends in Downstream Breeding</b>
<b>2010 Sensitization workshop on participatory varietal development</b>	<ul style="list-style-type: none"> <li>(i) Stakeholders informed about new project objectives (pre-set by international breeders)</li> <li>(ii) Small-scale producers targeted for breeding work with emphasis on income generation and utilisation of cowpea, but traders, processors and consumers not involved; emphasis placed on farmer and not consumer preference as farmers wrongly assumed to be representatives of all consumer categories.</li> </ul>

The multi-location testing of newly developed varieties was conducted under a single additive series of intercropping at benchmark sites or locations for evaluation based on general adaptation to bio-physical conditions. Here, involvement of local researchers, extension officers and farmers was crucial. Adaptive trials were conducted both on-station and on-farm, with relatively strong farmer participation to ensure that the proposed improved variety selected by farmers from among varied variety design options addressed their interests and constraints. Farmers subsequently co-selected improved cowpea variety with



**Fig. 4.2** Interactions with cowpea farmers and Telfun breeder in the field



local researchers.

In most situations, farmers were perceived as a homogenous group, without recognition of the different types of farmers (most obviously, subsistence or commercial). Involving farmers as distinct RSGs rather than just an undifferentiated whole can certainly be expected to influence the potential outcome and impact of breeding efforts insofar as their different interests will reflect in their variety characteristic preferences. Again, however, adoption of improved variety by farmers does not necessarily connote high consumer acceptability or domestic market competitiveness (below). Unfortunately, there was less involvement of other end-user groups such as traders, processors and consumers who are custodians of market level information relating to variety performance on the market in the downstream breeding phase.

At this stage the *interpretative flexibility* in variety design gradually diminishes as the differences in variety meanings among the RSGs involved in the variety development process are resolved and a *stabilisation and closure* are reached with a decision on which improved cowpea variety should be considered for release.

#### *Validation and variety release phase*

The third phase of the cowpea breeding concerns the validation of the proposed improved variety. In Ghana, a National Variety Release Committee (NVRC) – funded by the state through the Ministry of Food and Agriculture, Crops Services Division – is in charge of validation and variety release. Although the NVRC is an independent body, it applies internationally acknowledged standards for variety release. Before a proposed improved variety is considered for release, two major inspections are conducted, comprising station variety trials and testing in farmers' fields. These involve field trips to sites or farms, the taking of measurements, evaluation of yields, investigation of time of maturity, and inspection of planting material by a team of crop protectionists before multiplication for distribution to farmers. When a proposed improved variety submission is made, the breeder provides a minimum of two years of on-station and on-farm data to support the *claim of superiority* of new variety over existing ones. In addition to on-station and on-farm testing, data required for variety release consideration include physiochemical analysis and morphological characterization of the proposed new variety, sensory evaluation of farmer/consumer preferences, and economic analysis and environmental impact assessment. The breeder is also required to provide an appropriate name for the improved variety. The breeder establishes a breeder seed plot which the variety release committee visits at least twice, preferably at late vegetative or flowering and maturity stages. These visits enable the NVRC to become familiar with the new variety and also to ensure that the descriptions or characteristics provided by the breeder fit the improved variety.

The selection of improved varieties for release considerations is based on the internationally defined standards, Distinctiveness, Uniformity and Stability (the DUS principle); that is, stability in performance for grain yield and other superior qualities across sites and locations, distinctiveness from existing improved varieties, and uniformity in selected characteristics used in the variety description (such as plant leaf colour at different growth stages, seed colour and maturity time) (see also Gibson 2009: 242-55). On the day of release, the

‘breeding team’ puts these relevant data supporting the proposed variety release in the public domain. Afterwards, when satisfied with all submissions, the National Variety Release Committee (NVRC) includes the new variety in a communiqué on varieties released to be included in the National Variety Register.

The NVRC comprises representation from the following organisations and stakeholders:

- Grains & Legumes Development Board, MoFA
- Directorate of Crop Services, MoFA
- Directorate of Agricultural Extension Services, MOFA,
- Directors of Savanna Agricultural Research Institute and Crop Research Institute
- Representative of Ghana Seed Inspection Division Plant Protection & Regulatory Services, Crop Science Department of Universities
- Seed Producers Association representatives from both the northern and southern sectors
- Farmers’ representatives

This representation of stakeholders in the NVRC again indicates the exclusion of end-user RSGs from the categories of consumers, processors and traders. The ultimate goal of variety release process is more oriented towards farmer satisfaction, although some key informants expressed the opinion that farmers usually grow what traders and consumers want (thus assuming that farmer representation takes care of consumer and trader needs). Other informants expressed the view that consumer needs are under-evaluated in the NVRC composition and support an inclusive representation. Some impressions on the composition of NVRC expressed by key informants in 2010 are indicated below (emphasis added):

*On the **variety release committee**, my own impression is that it is **not well represented** and has to be properly constituted. Currently we have a situation where the breeders are their own judges. The breeders have so much influence because they present the methodology and their results without having them re-checked. The committee is not well resourced to effectively evaluate the work of the breeders. We do not have a well-documented register for varieties that have been released, such an important resource for future breeding work. We need to develop a prescribed format to store this kind of formation. (retired crop scientist and an eminent scientist on NVRC).*

*Currently the guidelines for breeding and variety release are under review. The idea is to **harmonize** breeding and variety release in the sub-region. There should be an **independent body** to conduct evaluation for variety release. I think the variety release committee is not well resourced to do their job effectively. Inspections are done at the invitation of breeders. Hence the breeders show what they want the variety release committee to see. (SARI breeder).*

*The **traders and consumers** are **not represented** on the variety release committee. The assumption is that farmers usually grow what traders and consumers want. Farmer representation therefore takes care of consumers and traders needs. (NVRC member).*

The impressions of the NVRC expressed above indicate the need to improve upon the efficiency of the committee in terms of representation of relevant social actors and composition, resources and autonomy of operation. At the time of these interviews, an international breeding organisation was reviewing the guidelines for breeding and variety release. The purpose of the review was to harmonize breeding and variety release in the sub-region.

Concerning the *stabilization/closure* or *interpretative flexibility* of the released varieties it is clear that on the day of the release of a variety, closure can be said to have occurred in so far as the NVRC perceive the improved variety as a solution to a breeding problem identified at the conceptualization stage. Nevertheless, the closure in interpretative and design flexibility in the variety development process is temporary (i.e. a short term solution to a specific breeding need) because of the following reasons, among others:

- Once an improved variety is selected and the NVRC confirms that a proposed new improved variety is an improvement over existing varieties (distinct, stable and uniform), individual farmers will later decide to adopt or reject the improved variety according to their own further interpretations and experiences about cowpea variety (see meanings constructed for cowpea among various groups of farmers, Chapter 2);
- In the long term, new designs can be re-constructed when the need arises in the social environment that the improved variety mediates and to which it is applied so as to achieve certain kinds of social goals;
- An improved cowpea variety also goes through another level of social construction of interpretative meanings among RSGs at the market level (Chapter 3); farmers may adopt and produce an improved cowpea variety, but the market performance of this improved variety has to be decided by other end-users, notably traders, processors and consumers.

To summarize the social organisation of cowpea variety breeding in Ghana, empirical findings show three major phases: the upstream breeding, downstream breeding and the validation and release. The upstream breeding involves the development of technical codes in variety designs or exotic lines using germplasm obtained from farmers as raw material at the international breeding centres. The variety design space has a *high degree of interpretative flexibility* (Pinch & Bijker 1984) which allows for genetic engineering and manipulation. Unfortunately this highly socio-technical space is only exposed to the international breeders that develop the exotic lines. Here, the international breeders inscribe in the technical codes of variety designs both technical specifications (mostly relating to yields and pest/disease resistance) and social goals (which include re-organisation of local production practices and input requirements). Assumptions are made by the international breeders about the social meanings ascribed to cowpea varieties in local contexts – or rather, non-locality specific (de-contextualised) assumptions are made about the social meanings inscribed. The international breeders determine different variety designs that nevertheless still show a wide variation of cowpea trait characteristics for selection towards specific technical and social goals downstream. However, downstream breeding activities, which basically involve adapting exotic lines in the local environment, are heavily influenced by international breeders through

set procedures and rules. At this stage the interpretative flexibility in variety designs diminishes as the differences in variety meanings among RSGs involved in the variety development process (mostly local researchers, farmers and extension officers) are resolved, when a decision is reached on which improved cowpea variety should be considered for release in the validation phase.

At the validation and release phase, differences in interpretative and design flexibility are settled and come to a temporary closure as the NVRC perceives a proposed improved variety as an improvement over already existing varieties; a solution to an identified breeding problem. Although variety designs are supposed to be flexible so as to reflect all the differences in the interpretative meanings among different RSGs, in reality variety designs are stabilised and fairly well closed much earlier upstream due to the checks put in place through breeding rules and procedures formulated by the international breeders that virtually control the genetic engineering aspects of the variety development process.

#### **4.4 Extent to which improved cowpea varieties address social needs of smallholder farmers, small-scale processors and consumers**

Empirical findings show that the organisation of cowpea breeding for variety development in Ghana overlooks the importance of other RSGs, notably traders, processors and consumers (Table 4.2). These actors could play a key role in re-opening design development and change the ways in which varieties address the social needs of local populations. Empirical evidence (Chapter 3) also suggests a mismatch between consumer preferences and locally improved cowpea varieties, which are becoming unpopular on the Ghanaian markets. As indicated in Table 4.3, only half of the improved cowpea varieties released in Ghana are light coloured and as many as *7 out of 10* have a non-white seed colouration, which stands in direct contradiction the high consumer preference for a white seed colour according to the study reported here (see also Quaye et al 2011; Zannou et al. 2004: 393-20, Langyintuo et al. 2004: 203-13). Moreover, the darkest (red/brown) improved varieties (*Adom*, *Bafo* and *Soronko*) also have longer maturity periods while the research has shown (see Chapter 2) that farmers prefer early-maturity varieties (a preference met, admittedly, by the light red seeded varieties (*Asontem* and *Vallenga*). Concerning seed colour and yield potential the table shows that the improved red seed variety *Boafo* has the lowest grain yield, followed by white seed colour varieties *Bengpla* and *Akpaagbala*. In short, the interrelated breeding objectives of seed colour, days to maturity and grain yield as realised in the varieties developed in Ghana over the last two decades of cowpea research and product release appear not to reflect the preferred characteristics of RSGs very well (Chapter 2); the failure to better meet the consumer demand for white seed varieties in particular maybe regretted.

Acknowledging the complexity of the interrelation between various breeding priorities, it is crucial to reduce the crowding out of smallholder farmers from their domestic markets and improve the linkage of food production and consumption. Clearly this involves a reconsideration of the choices made in improving certain variety characteristics through cowpea breeding – or rather, and more profoundly, a reconsideration of how these choices are made. Therefore, in order to explore the extent to which improved cowpea varieties actually

meet socio-cultural expectations and variety preferences among different local RSGs (smallholder farmers, small-scale processors and consumers), I now investigate the power imbalances that limit or facilitate the participation of these groups and their influence in variety development and the socio-cultural and technical assumptions upon which these are based.

**Table 4.3** Improved cowpea varieties released in Ghana

Variety	Seed colour	Days to maturity	Grain Yield (t/ha)
<b>Aiyi</b>	White	65-70	2.0
<b>Bengpla</b>		62-67	1.8
<b>Akpaagbala</b>		65-70	1.8
<b>Asetenapa</b>	Cream	63-70	2.5
<b>Marfo-Tuya</b>		65-70	2.0
<b>Asontem</b>	Light red	60-65	2.0
<b>Vallenga</b>		60-65	2.2
<b>Boafo</b>	Red	75-85	1.2
<b>Adom</b>	Dark red	66-72	2.5
<b>Soronko</b>	Brown	70-80	2.5

Source: MoFA (2005)

#### *Power relations in the upstream breeding phase*

The research on the cowpea breeding during the 20-year period under review (1990-2010) has shown a *strong influence of international researchers* in the variety development process, especially at the *conceptualization stage*, while participation by local stakeholders in setting objectives is limited. This strong influence of the international researchers is largely due to the role scientific standards play in breeding programmes as well as to accessibility and availability of resources, such as technical know-how, research infrastructure and funds, which are not available to the local researchers. As Foucault (1982) observed in his analysis of the operation of power in structures and resources as well as in intangibles like knowledge, such an imbalance in the accessibility to resources implies that the most empowered in terms of resource accessibility and availability can set the rules of the game.

The international breeders are able to *set the rules and scientific standards* of formal breeding programmes and acquire far-reaching social power by inscribing their own social meanings in technical (proto-) artefacts such as new exotic lines to be used for downstream variety development. Farmers and other end-users are essentially recipients of this, peripheral in their inability to influence the development of these new exotic lines which represent the technical specifications and the social meanings ascribed to end-users by the structurally and geographically distant international centres of breeding. Standardization of rules and procedures for variety development is enacted with the original intention of the universal application of variety design. Indeed, the standard rules and procedures in formal varietal



breeding do allow for proper co-ordination and comparison of results across countries. However, it also assumes an international commonality of socio-cultural contexts and, moreover, prescribes specific kinds of data gathering and procedures to be performed at the downstream breeding level by local research institutions (For example prescribed crossing methods to generate F1 and F2 populations for studies on inheritance of resistance to aphid). Both issues (socio-cultural commonality and specific procedures) may, however, be challenged by local research institutions based on the awareness that, regardless of environmental and agro-ecological conditions, socio-cultural differences between territories exist that imply location specific breeding programmes.

The development of differentiated breeding programmes has to cope with the *globalizing breeding framework* that has emerged and which forecloses precisely those differences in socially constructed meanings of variety designs that are locality specific. This framework also contributes to farmers' dependency on the external supply of seeds and inputs – which is generally antithetical to the smallholder position, and certainly in this case (Chapter 2) – but also to an undesired over-reliance on *unequal relations* with certified seed sellers and other input dealers– the former empowered by their privileged position in the supply chain and the latter by the awareness that the farmers are bound by the seed designs to purchase their products. However, these power relations also are not absolute and may be adjusted by various initiatives, as the research on cowpea breeding presented here has exemplified. The empirical findings on contexts issues (Chapter 2) suggests that instead of global downstream breeding frameworks, multi-targeted and context specific breeding programmes need to be installed, which are more appropriate to a focus on different kinds of production.

The research on cowpea production (Chapter 2) has also shown that there is a split (and not the assumed commonality) in cowpea varietal preferences with two different production objectives (either for household consumption or the local market). This has implications for the priority settings of cowpea variety development. Instead of breeding according to common technical specifications (e.g. high yield for sale), the split in cultivation practices suggests distinct programmes, one oriented to farming for household food provisioning and the other to production for sale. The latter might also be usefully divided into two, on the basis of a distinction between the resource poor smallholder and the larger scale business enterprise. For the former, the level of inputs required need to be minimised, as their lack of resources leaves them in double jeopardy when a crop fails, because of lack of rain for example, when they are unable to bear the risk of a lost investment and not only incur a livelihood for that year, but find themselves indebted long-term, perhaps ultimately beyond their means (in which case they may be forced off their land). Larger (non-small) scale concerns also look to minimize risk of course, but tend to have access to capital that enables them to survive a bad year and thus concentrate more narrowly on high returns. For them, the payoff of higher yields for greater inputs is a somewhat simpler equation. Distinction between both production objectives and scale, therefore, might have a direct effect on varietal development programmes.

Such acknowledgement of *diverse production systems* enables a focus on the needs and practices of small-scale farming, especially subsistence farming, which largely operates

outside of the market. One such concern relates to seed purchase. Although cowpea is an open-pollinated crop, commercial farmers are advised to buy new seeds for planting each year to ensure the higher germination percentage that improved varieties offer. The assumption that cowpea farmers can and will buy the certified seeds for cultivation every year is challenged by the preference of small-scale farmers to produce their own seeds and to preserve strains both for later use as well as for posterity. Producing their own seeds is valued by farmers not only because it involves knowledge and labour, which they can supply, rather than financial capital, which perhaps they cannot, but as a traditional practice and a cultural role to preserve bio-diversity resources. Here, therefore, it is important to note that it is possible to re-construct new variety designs that allow for farmers' seed saving practices. According to Vroom (2008), such a redesign of technology is not only possible in respect of the technical specifications but also in the social relations they mediate, which are implicitly built into the variety development systems. The empirical research reported here has shown that the assumption related to willingness to buy certified seed for planting every year plays out differently among various relevant sub-groups of farmers. For commercial farmers, the cost implications and biosafety issues of seeds may not be problematic, but the same cannot be said for subsistence farmers. The current situation in which the certified cowpea seeds need to be purchased every year represents another familiar complaint, one common among the mass of the world's resource-poor smallholders, and one that is quite clearly created by design, in both senses (inscribed into the technical code, intentionally). In short, it is clear that a better understanding of the opportunities for improved cowpea variety development should not be based on a repetition of general assumptions (about farmers and farming production systems that, informed by the globalising breeding framework, ignore diversity), but on the basis of empirical, contextual analysis of the interrelation between seed practices and production systems (at, or certainly building from the local level).

#### *Relations of power in the downstream breeding and validation phases*

The review of past and present cowpea breeding activities in Ghana shows that at the downstream phase, farmers were given the *opportunity to co-evaluate varieties* together with scientists within the breeding framework and goals set by the international organisations. Also reflections on RSGs and downstream power relations (Table 4.2) show that cowpea breeding efforts in Ghana have been characterised by the participation of farmers, particularly as co-evaluators in variety evaluation programmes or as co-selectors in participatory variety selection (PVS) in different agro-ecological zones in Ghana. PVS, however, should not be confused with participatory plant breeding (PPB). As Sinwell (2008) explains, PVS assumes the involvement of local farmers in a pre-determined agenda (inscribed in the exotic lines) which is more of an internalisation process than genuinely participatory process.

PPB focuses on research-extension-farmer linkages (Smith et al. 2001: 551-63, Martin and Sherington 1997: 195-16). It creates a more effective dialogue between researchers and farmers, in which researchers learn about the local farming conditions and traditional diversity management as well as the specific needs and preferences of farmers and farming households (Kitch et al 1998: 475-86, Cleveland 2001, Machado & Fernandes 2001: 567-73, Kamara et al 2010:355-70, Trouché et al. 2011: 19-28). PPB also implies that farmers in a

particular community participate in variety evaluation process and are responsible for the choice of the best varieties. Walker (2006) emphasises that the *degree and timing of farmer involvement* are crucial in PPB. PPB implies farmer involvement as intrinsic to and throughout the plant breeding process (as opposed to PVS, in which farmers are engaged just in the later phases of the plant breeding process, working with stabilised materials).

Various authors (Almekinders & Elings 2001: 425-38, Weltzien et al. 2008: 156-71, PRGA 1999, Almekinders 2011) and also my own interactions with local breeders indicate that actually this does represent an upgrading of the farmer's role in breeding, an improvement from previous practice in which farmers were given finished varieties developed by plant breeders to decide whether or not to adopt, to the situation now, where farmers participate in testing procedures and identification of materials that still show high degree of genetic variability for further improvement. Nevertheless, it should also be acknowledged that farmers often tend to internalise upstream breeding objectives established by the international breeders, to the extent of recommending those research priorities which are coherent with the assumptions of international breeders even though they may, in fact, contrast their own interests. A critical analysis of farmer participation implies that not only of the extent but also of the content of this participation be examined.

In terms of range, interactions in Ghanaian cowpea breeding activities are largely limited to farmer-extensionists-scientists. From the literature, the story appears to be similar elsewhere (Ceccarelli & Guando 2007: 349-60). PPB should not be limited to farmers-extensionists-scientists, however, but also *include other actors* (Sperling et al. 2001: 439-50, Morris & Bellon 2004: 21-35. Unsatisfactory as it is may be, Ghana's local farmer participation in both breeding and validation phases is still relatively strong as compared with the involvement of local traders, processors and consumers. This research has revealed that in addition to farmers, other end-users should also be encouraged to participate in PVS/PPB. Without the inclusion of these actors in the social-technical process of variety development, participatory plant breeding is limited in scope and thus value. Urban consumer preferences need to be integrated in the breeding process to enhance domestic market access by smallholder farmers using locally produced seed. Unfortunately, consumption related variety preferences have not been adequately captured in past breeding activities since farmers were mostly relied on for such information. Farmers were considered consumers, but in practice this RSG cannot represent the varied segments of consumers in the market place (Chapters 2 and 3). This is especially true for subsistence farming system in marginalised areas where resource-poor farmers have diverse variety needs as compared to those of urban consumers (Smith et al. 2001: 551-65).

#### *Socio-cultural assumptions incorporated in the 'technical code' of cowpea design*

The huge need to improve the attuning of these breeding activities to the domestic market demands a concrete challenge to some socio-cultural assumptions in the technical code of cowpea breeding. These are:

1. The assumptions that i) farmers are also consumers and therefore *farmers know what consumers want* and ii) that farmers are *interested in cowpea varieties with high market value*

Empirical findings from Chapters 2 and 3 show that the situation is much more complicated for both issues. Concerning the first assumption (farmers are and know consumers), the research has shown that important differences exist among (smallholder) farmers producing primarily for household provision (subsistence farmers) or for income (commercial farmers), and that these different perspectives are reflected in their different variety choices. Farmers have different relations to the market, with some neglecting it due to their focus on household food provision and others perceiving it as an important source of additional income. Is actual breeding, therefore, concerned with market or household consumption or a mix of both? And are variety preferences related to specific (local) food uses considered at the upstream breeding phase? From the documents reviewed and presented in Tables 4.1 and 4.2 it appears that these considerations are not well integrated into Ghana's cowpea breeding activities and, moreover, are even not considered as the basis on which key breeding objectives need to be formulated.

2. The assumed possibility of a *universal application of cowpea variety designs*

This is built upon the assumption that there is a commonality in the different socio-cultural contexts across countries and that a globalising breeding framework is able to develop 'miracle seeds' which go beyond the differences of the various production and ecological systems.

3. The assumption that once a variety is adopted and produced by farmers, and even sold, it reaches the *end of its social construction*

This ignores the factor of how a particular variety is performing on the market. This research has revealed several insights into the ways in which consumers' understanding of grains characteristics can become an integral part of reconstructing the cowpea variety designs, which represents a continuous and iterative process.

The empirical findings reveal various asymmetric power relations in cowpea breeding influenced by the activities at international research institutions, the breeding standards and rules, certification of seeds and various socio-cultural assumptions. The research has also shown that these politicizing (Ruivenkamp 1989, 2005) activities effected by and through various protagonists – or actants (Latour 2005) – such as international researchers, breeding standards, certified seeds and variety release rules can be challenged by widening the range of RSGs participating in the different phases of variety development.

The involvement of traders, processors and consumers in variety development, however, may also lead to tensions with local researchers, as is shown in Table 4.4. Some researchers find the idea of widening the range of RSGs participating in cowpea breeding to be a positive contribution to the re-construction of variety. Other researchers consider the involvement of traders, processors and consumers in cowpea breeding impossible due to practical limitations

**Box 4.1** Some stakeholders' views on the participation of traders, processors and consumers in breeding

**Relevant..? Necessary..? Possible..?**

*The traders and consumers are not represented on the variety release committee. The assumption is that farmers usually grow what traders and consumers want. Farmer representation therefore takes care of consumers and traders needs...*

(Member of NVRC member, 2010)

*Conventional breeding work has been on the Maruca pod borer pest. Breeding can take as long as five years. Varieties are released and there is a problem with marketing because most of the varieties are from IITA and are brought for farmer field trials and selection. Basically, suitability to ecology and yield testing has been the focus. The current IITA breeding program does not include some of the popular varieties on the market. We need also traders and consumer views in selection trials. Some farmers have gone ahead to cultivate the foreign varieties but were not successful...*

(Staff, MoFA, 2009)

*As a breeder, you are supposed to know what you want to breed for. In other words a breeder should know what both farmers and consumers want. Through earlier association with MOFA, farmer and consumer requirements are known. Currently, the procedure for finding out consumer requirements is weak. There used to be an annual cropping conference where feedbacks on breeding activities were obtained from extension staff.*

(Breeder, CRI / Retired lecturer UOG, 2010)

*Well, to the question of whether consumers' concerns are addressed in participatory breeding I will say yes. However, our breeding work has not been fully participatory due to financial constraints. Participatory breeding is very expensive and becomes more expensive if you want to fully involve traders, processors and consumers...*

(Breeder, SARI, 2010)

*Involvement of traders and consumers in participatory breeding is ideal but this group cannot be involved at the beginning. It is highly technical at the initial stages. However I believe gradually the extent of participation of traders and consumers in breeding activities will increase. Formerly breeding was highly focused on yield but now we look at market performance as well especially with rice where you need test marketing of improved varieties...*

(Agronomist, CRI, 2010)

*...As of now, most breeding activities see the farmers as consumers. The consumer is generalised as compared to breeding in developed country where farmers may just produce for the market with limited consideration to household consumption. Farmers in developing countries mostly produce what they consume. However, what farmers want as consumers may be different from what the market demands. Too much emphasis is placed on production. The words 'participatory breeding' have been somehow abused. Sometimes people refer to participatory varietal selection as participatory breeding. Market influence in breeding activities is weak. Breeding for commercial purposes must start with a market survey. What informs consumer choices?*

(Breeder UOG, Legon, 2010)

in terms of funding, the technicality of breeding and time constraints. Some of these researchers also see the technical aspects of breeding as unlikely to attract the attention of other RSGs. Still other researchers have internalized the above mentioned cultural assumptions and view small-scale farmers in Ghana exclusively as consumers and perceive them as having all the relevant information pertaining to consumer choice for improved variety characteristics which makes the involvement of other RSGs in PPB unnecessary. It is clear that the idea of integrating consumers PPB still provokes a wide range of adverse reactions as shown in Table 4.4 which indicates that there is still a long way to go before these suggestions will be integrated in the institutional setting of plant breeding in Ghana.

#### **4.5 Possibilities for re-constructing cowpea variety design**

Critical reflections on the empirical findings on the social organisation of the twenty-year history of breeding activities in Ghana enabled us to indicate the following three interrelated possibilities for re-constructing cowpea variety design in Ghana, based on:

- (1) Addressing the *power imbalances* in the technical codes of variety designs
- (2) Reformulating the *socio-cultural assumptions* of the technical code in variety designs
- (3) Opening up the current breeding network by *including other RSGs*, notably consumers, processors and cowpea traders.

The first two issues are discussed here in relation to upstream breeding, while the third is discussed within the domain of downstream breeding activities.

##### **1. Addressing the power imbalances in the ‘technical code’ of cowpea variety design**

From this research, two clear debatable domains for addressing the power imbalances in the ‘technical code’ of cowpea variety designs are identified:

- The issue of participation of other RSGs in the varietal development process
- The issue of changing inter and intra relations among the actors in the three breeding phases.

Concerning the *participatory aspect*, it has been emphasised that other social norms may be embedded in the material design of cowpea varieties, or technologies (Feenberg 2005), through the involvement of other actors in upstream breeding activities. However, this requires changes in the social organisation of breeding. The research reveals that asymmetric power relations in cowpea breeding operate and are maintained through the functioning of standardized breeding procedures developed institutionally through international breeding centres and organisations. There is a top-down approach to variety development (also observed by Pimbert 2006) which is built upon the prescriptive influence of the standardised rules and norms of a global breeding framework. The freedom to act by the local researchers becomes constrained by these breeding procedures and normative references.

For more context-specific approaches to varietal development more bottom-up approaches need to be installed, steered by the multiple interests of small-scale farmers and other RSGs, such as consumers. This means not only that local actors need to be resourced adequately in order to actively participate and make effective contributions from the conceptualization stage through to the utilization of an improved variety, but also that these standardized breeding rules need to be challenged by the instalment of another organisational (bottom-up) setting in which breeding takes place. In this new organisational setting – with other rules and standards – local researchers who understand the context specific challenges and opportunities need to be empowered through increased local investments in research to boost the level of commitment and participation in variety development processes in order to enhance small-holder access to the domestic market. By bringing new RSGs into the breeding network, technological power that has been ‘wielded’ by the minority (technology developers at the international research centres) becomes democratized, allowing for other social values and meanings to shape both the problem definition at the conceptualization stage and finding potential solutions at subsequent stages of variety development (Winner 1985, Kloppenburg 1988, Ruivenkamp 1989, 2005, Broerse & Bunders 2000, Vroom 2008, Feenberg 2010). I argue that in Ghana we need new institutional rearrangements that encourage greater engagement of local researchers and other RSGs in upstream breeding activities carried out in renewed institutional settings.

## 2. Reformulating the socio-cultural assumptions of the ‘technical code’ in variety designs

The empirical research has shown the mismatch between cowpea consumer preferences and cowpea variety developments in Ghana. This mismatch is related to fixed and (partly) in accurate perceptions of the activities, positions, interests of various groups of actors, which are built upon various specific socio-cultural assumptions. The empirical findings suggest that these socio-cultural assumptions underlying the technical code in variety designs should be opened up for scrutiny. In particular, the assumption of a commonality across countries to which cowpea variety designs can universally be applied has combined with the centralized, top-down approach (above) to disconnect breeding programmes from location-specific contexts. Informed by and part of the abstract (de-contextualized) model of modern agriculture, this has created the observed lack of breeding activities attuned to local needs and preferences.

The assumption of commonality does not only neglect contextual differences but also creates the opportunity to come up with standardized procedures universally applicable at an international level. It may even lead to breeding programmes in which the researchers search for varieties applicable to all contexts (the so-called ‘miracle seeds’), or that they look for varieties which may imply that these contexts need themselves to undergo changes to be better adapted to utilize these new varieties. A concrete example of the implications of this search for standardized varieties across countries is the over-reliance on certified seed. Instead of positioning the national research institutions within this globalizing breeding framework, the research results indicate an alternative trajectory, that of launching *multi-targeted and context specific breeding programmes focusing on different kinds of production systems*. This means programmes that distinguish the context of subsistence farming systems

from that of commercial farming systems. For the latter, variety selection should match market preferences, which might not be the choice for subsistence farming systems needing to meet household food provision requirements before considering what to sell.

### 3. Opening current breeding networks (by increasing participation of end-users in variety development)

The technical code concept implies not only an unravelling of existing asymmetric power relations, but also a reflection on opportunities for reconstructing existing cowpea variety designs so as to realise more technically and socially desirable outcomes from cowpea variety development programmes.

Observations made in the empirical research results indicate that a range of local actors need to be involved in the different phases of cowpea variety development. As outlined, this includes the involvement of key local actors in the crucial upstream breeding stage, which remains dominated by the interests and cultural horizon of the international research institutions. Local researchers who understand the context specific challenges and opportunities also need to be empowered through increased *local investments in research* aimed at boosting the local level of commitment and participation in (especially early-phase) variety development and selection processes for endogenous development.

In downstream and validation phases, the research presented strongly suggests the need to involve end-users other than just farmers, such as consumers, processors and traders. The costs of this, of course, need to be recognised, as with other democratizing measures listed (above). Opening the existing cowpea variety development networks to a broad range of additional RSGs may require a lot of time and money. High costs may be involved in participatory PPB, especially in developing countries where breeding efforts are meant to target resource-poor farmers who are widely spread in marginalized and relatively inaccessible areas (Martin & Sherington 1997: 195-16). Represented as an investment in democracy that will have longer-term financial and other payoffs, however, this may be more palatable. The mismatch between improved cowpea varieties developed in Ghana and Ghanaian consumer preferences appears to be directly linked to the weak market positioning of locally improved cowpea as compared to foreign cowpeas, and this may eventually lead to higher socio-economic costs with the gradual crowding out of small-scale farmers and loss of incomes. Such an outcome may be perceived from a national perspective, implying a state level response in the form of increased funding in the directions proposed.

Essentially, the empirical research results are considered here as entry-points through which to reflect further on the opportunities for opening up the existing cowpea breeding networks to other RSGs, notably, traders, processors and consumers. This can be realised by organising the following activities:

- Elicit the views of traders, processors and consumers through informal market surveys, especially for the upstream stage of setting the breeding objectives and at the final stage of releasing improved varieties. Participatory appraisal methods using semi-structured interviews at various market centres could be employed regularly to



keep pace with changing end-user preferences. Consumer preference is constantly changing and can easily affect the determination of grain characteristics during the course of the breeding period, which usually spans many years.

- Conduct consumer acceptance testing of proposed improved varieties as against varieties on the market, both locally improved and foreign varieties. Such testing should not just be limited to varieties at the production or farm level, but also include varieties found at the market level for better indication of the market competitiveness of proposed improved varieties. Samples of improved varieties could be given to traders to evaluate against varieties found on the market. This approach is different from sensory evaluation, which focuses on the acceptability of cooked food products in investigating subjective trait, (taste, aroma, appearance, texture and other characteristics that determine the suitability of a particular variety for culinary use) (Morris & Bellon 2004: 21-35). In this context, consumer acceptance testing would investigate cowpea variety preferences using liking ratings in both field (market) and sensory (laboratory) settings.
- Consumer preferences should be obtained from traders, processors and consumers throughout the breeding processes. This is useful for gauging market performance and the competitiveness of proposed improved varieties, and gives society (market) the opportunity to shape and reshape variety (technology) through regular feedback mechanisms.
- The NVRC should be adequately resourced to work effectively and ensure that societal needs are adequately captured in breeding. This will also reinforce the development of market driven cowpea varieties. The NVRC should include representatives of traders, processors and consumers.
- Research institutions should make budgetary allocations for partnering with all relevant local stakeholders; not only farmers, researchers and extensionists, but also traders, processors and consumers in research planning, design through implementation, and monitoring and evaluation.

#### **4.6 Concluding Remarks**

The Cowpea variety (technology) development process in Ghana has been critically investigated from the technical code concept to reveal the socio-cultural assumptions and power imbalances among the RSGs in the various stages of variety development process. The research shows the *strong influence of international researchers* in the development of exotic lines upstream, largely due to issues around the accessibility and availability of resources, such as technical know-how, research infrastructure and funds which are not readily available to local researchers. Downstream breeding activities are centrally controlled through the functioning of standardized breeding procedures developed by international breeding institutions working at the upstream breeding phase with the original intention of universal application of (cowpea) variety design. This research draws attention to the need for context-specific and bottom-up approaches to variety development that reflect the multiple interests among RSGs at the local level.

In line with the above, empirical findings show the need for change to the asymmetric power relations among RSGs in the cowpea breeding network, particularly the need for the international researchers to divest responsibilities to local researchers with respect to the development of exotic lines and breeding standards and procedures. This requires institutional rearrangements that encourage greater engagement of local researchers in upstream breeding and the entrance of other RSGs into the breeding network. To enhance flexibility in attuning exotic lines developed at international organisations to locality specific contexts in downstream breeding, this study recommends the establishment of multi-targeted (rather than global) breeding frameworks with clear breeding objectives to consider the differences in variety preferences at production and consumption levels, for both market and household consumption.

Investigations into cowpea breeding activities in Ghana also show that interventions have tended to concentrate heavily on technical issues like yield, time of maturity, stress tolerance and disease resistance. However, the research has also shown that it is crucial to include social issues such as consumer preferences and differentiated production systems in reference to cowpea traits for a better match of variety breeding to market development. In order to develop tailor-made and domestic market driven varieties, there needs to be a strong integration of traders, processors and consumers in the breeding network, through i) regular domestic market surveys and consumer preference studies to elicit the views of traders, processors and consumers, especially at the initial stage of breeding research agenda setting and the final stage of release; ii) the full, active involvement of farmers, traders, processors and consumers as co-researchers in participatory variety development, including but not limited to variety selection and evaluation; and iii) the representation of traders, processors and consumers on the NVRC so as to ensure that consumer preferences are met.

## CHAPTER FIVE

### Market access and food sovereignty: Case study of the Ghana School Feeding Programme (GSFP)<sup>21</sup>

#### 5.1 Introduction

This chapter investigates the Ghana School Feeding Programme (GSFP) as an entry point or lever for linking food production and consumption in Ghana at the local level. Access to local markets for the products of smallholder farmers is one of the key issues in the food sovereignty debate, and various international aid organisations are trying to boost rural development and alongside improving health and also education through the operation of school feeding programmes. In 2003 the Home Grown School Feeding (HGSF) was initiated by the New Partnership for African Development (NEPAD) in collaboration with the World Food Programme (WFP), United Nations Children's Fund (UNICEF) and Food and Agriculture Organization (FAO), as well as the Millennium Project Hunger Task Force<sup>22</sup>. The Ghanaian version of this international programme is the Ghana School Feeding Programme (GSFP). In view of the international administrative context in which the HGSF was installed, the Ghanaian programme contained various developmental objectives, including improvement in education, empowerment of women, increases in farm productivity and eradication of poverty through resource mobilization and community ownership. Efforts were also made to speed up the implementation of the programme, which resulted in the 2003 signing of a WFP-NEPAD memorandum of understanding to pilot HGSF programmes in Ethiopia, Kenya, Malawi, Mali, Mozambique, Nigeria, Senegal, Uganda, Zambia and in Ghana (Calder and Ahmed 2004, Grantham- McGreyor (2005), WFP 2007a, Tomlinson 2007). It was planned that the HGSF would be reaching 50 million children of school going age by 2015, which should benefit at least two million poor farmers.<sup>23</sup>

In Ghana in 2005, a pilot project was established with ten schools, one for each of the country's regions, and by 2008, over 650,000 primary schoolchildren in Ghana (nationwide, in all 170 districts) were enrolled in the programme; a programme review in 2011 led to a target figure of over 1.1 million children for the end of 2012.<sup>24</sup> The GSFP has as its mandate the feeding of one hot meal a day to school children from kindergarten through primary years one to six. Initially funded by the Dutch and Ghanaian governments (Phase 1, 2007-2010), the GSFP is strategically designed to fight hunger and reduce poverty, focusing on locally grown

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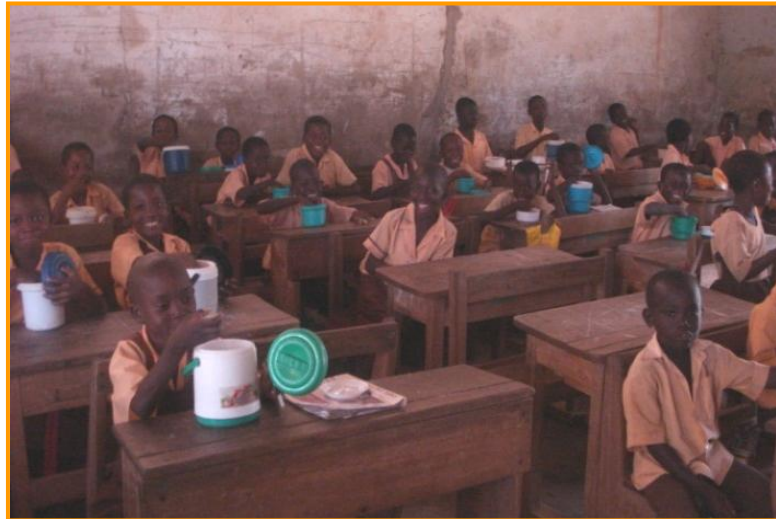
<sup>21</sup> This chapter is a revised version of Quaye, Jongerden, Frempong, and Ruivenkamp (2010).

<sup>22</sup> School feeding falls within the ambit of the UN declaration, and is related to at least the first three Millennium Development Goals (MDGs), namely to eradicate extreme poverty and hunger (MDG1), achieve universal primary education (MDG 2) and promote gender equality and empower women (MDG 3).

<sup>23</sup> Assuming 50 million children would need five million tons of food over the 220 days of a school year, which would require the produce of a minimum two million smallholders (Tomlinson, 2007).

<sup>24</sup> At <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=237004> (April 2012).

foodstuffs like maize, rice, soybean, cowpea, millet and sorghum. The programme has wider implications for farmers in strengthening community food production and consumption systems through reduction in post harvest losses, provision of a ready market for farm produce, incentives for increased production and, ultimately, the enhancement of food sovereignty. The longer term development objectives of the GSFP of poverty reduction and food security are aimed at through three immediate objectives, i) to reduce hunger and malnutrition, ii) to increase school enrolment, attendance and retention, and iii) to increase production. In respect of the objective of food production, there are three specific goals, each with quantified targets – an 8% increase in farmers’ income, 8% increase in employment at community level and 40% of schools to have farms supplying food for the project.<sup>25</sup>



**Figure 5.1** School feeding in Northern Ghana

As part of the debate on food sovereignty, the international peasant/social movement Via Campesina has raised concerns about the lack of access to local markets for smallholder farmers and argued for locality specific market protection policies. Certainly, it can be argued that the international HGSF Programme and the GSFP do represent efforts by (inter)national bodies to realise an enhanced access to local markets by smallholder farmers. In view of the international setting and support for the implementation of these programmes, therefore, this chapter undertakes a sociological investigation of the efficiency of the GSFP from the perspective of food sovereignty. The core question of this chapter is:

*What is the role of the GSFP in linking local food production and consumption for enhanced market access by smallholder farmers?*

The sub-questions are:

- How and by which social groups are the conceptualization and implementation of the GSFP organised?
- What (asymmetric) relations in the GSFP constrain market access by smallholder farmers?
- Which opportunities exist for enhancing the involvement of communities and local actors in the GSFP to strengthen the linkage of smallholder farmers produce to school food consumptions in Ghana?

<sup>25</sup> <http://www.sign-schoolfeeding.org>

## 5.2 Research methodology

Methods used to address the research questions of this chapter include a study of policy reports and performance of surveys and interviews, with the collected quantitative data analysed using the Statistical Package for Social Sciences. Reports have been examined and interviews held with key players in order to study the involvement of social groups in the conceptualization and implementation of the GSFP. An MSc thesis (Punt, 2009) has also been written in which also the (limited) extent of involvement of local actors in programme implementation has been investigated. Regarding the gathering of information about the GSFP participating communities, a combination of quantitative and qualitative methods have been applied, complemented with extension work done by the MSc. student. A conventional survey instrument was designed for one-on-one interviews, while an interview guide was employed for focused group discussions and key informant interviews conducted to gather qualitative information. Questions covered the socio-economic profile of respondents, participation in GSFP, information flow, access to productive resources, market access and impact on household food sovereignty. Other sources of secondary data included reports by the MSc. student, monitoring and evaluation of reports on GSFP, and other internet reports on the GSFP website at SIGN.<sup>26</sup> Brief interviews were also made with Agro-Eco and Millennium Village Project officials on the subject of access to the GSFP market.

Four districts were surveyed: Manya Krobo (Eastern Region) and Mfantiman (Central Region) both in southern Ghana; and Tolon Kumbungu (Northern Region) and Navrongo (Upper East Region) in northern Ghana. The selection of these districts was based on participation in GSFP, farmers' access to the market created through school feeding, concentration of farming communities, distribution of hunger hot spots and accessibility, as well as geographical (south/north zonal) coverage. A total of 400 people were interviewed, comprising 360 farmers and parents of children in the GSFP programme and 40 key informants. Key informants included personnel of the District Assemblies, District Coordinating Directors and heads of GSFP primary schools and GSFP matrons – who play a key role in the implementation of the programme at school level, including food purchase. Interviews were conducted between August and November, 2008.

For the MSc work, social analysis of the GSFP was conducted in Akwapim South and Akwapim North (both in Eastern Region), Dangme-East (Greater Accra Region) and Tolon Kumbungu (Northern Region). Methods employed in the extension work included exploratory interviews with GSFP caterers, head teachers of GSFP participating schools and local farmers in the participating communities. Also, participant observation of the cooking activities offered opportunities to talk to the cooks, pupils and teachers. Other activities included market visits and interviews with agricultural extension officers.

Although this study was designed to capture small-scale farmers who had access to the market created through the GSFP in order to assess the socio-economic impact of the programme in terms of food sovereignty, it actually proved rather difficult to identify small-

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<sup>26</sup> At: [www.sign-ghanaschoolprogramme.org](http://www.sign-ghanaschoolprogramme.org); see also: <http://hgsf-global.org/ghana>.

scale farmers in GSFP participating communities who were growing and selling cowpea, the commodity focus here. Instead, therefore, small-scale *rice* farmers (in Navrongo, Upper East Region) were included in the sampling. The socio-economic impact of the GSFP on these smallholder farmers was explored using two household level, food security measures as proxies for food sovereignty: i) Household Food Availability (HFA), covering people's anxiety and uncertainty about their food supply and their intake in terms of poorer quality and reduced quantity of food consumed; and ii) Months of Adequate Food Provisioning (MAFP), covering household food stocks.

The quantitative data collected was analysed using the Statistical Package for Social Sciences (SPSS, version 16). Conceptually, the RSG concept is applied to investigate the level of involvement of local actors in programme implementation, factors constraining market access by smallholder farmers, and how the GSFP can become an endogenous structure that facilitates market access by small-scale farmers for enhanced food sovereignty.

### **5.3 Conceptualization and implementation of the GSFP**

The Ghana School Feeding Programme (GSFP) is heavily bureaucratic structure (Figure 5.2). The initial administration of the GSFP fell under the Office of the President, which established the Inter-Ministerial Committee on School Feeding (IMC) for the start-up phase and programme establishment up to the end of 2007. During this period, the IMC was the decision-making and oversight authority for the GSFP (and all other feeding programmes in Ghana). At the end of 2007, the IMC was phased out and its ministerial membership absorbed into the Programme Steering Committee (PSC).

The establishment of the high level IMC illustrated the priority the government gave to the GSFP and its anxiety to ensure synergy through effective ministerial coordination and collaboration. Replacing the IMC, the PSC was supposed to be a relatively flexible institutional framework. However, there were practical difficulties in implementing inter-ministerial decision-making. Ministers could not be available as required and some of the ministries did not have the capacity to function effectively. Furthermore, there were probably just too many ministries built into the GSFP structure for effective communication and decision-making. This only frustrated participation by local stakeholders, supposed to be programme beneficiaries but almost completely uninvolved in the structural organisation of the programme. As a result, although the GSFP was supposed to be decentralized, in fact a top-down decision-making process was implemented with very little community involvement (below).

Unsurprisingly, the problematic nature of the initial set-up manifested also in terms of the access by smallholders to the GSFP. Clearly this new, large, state-administered programme presented a huge potential market for local farmers, which was part of the rationale for the project. Yet the difficulties in this respect were manifest from the initial conceptualization and implementation of the programme as evidenced in a brief report prepared by Afoakwa (2010:5) by the completion of Phase 1. Afoakwa (2010) listed several 'additional requirements' that were 'being considered' in order to 'ensure sustainability of the

programme,' the first of which was the 'creation of appropriate policies and frameworks that would link market access of farm produce by local farmers to the School Feeding Programme. Clearly farmer access was deemed to be failing as a function of the way the project had been set up. Before going on to look in more detail at the issues with GSFP in respect of the core question of linking production and consumption for smallholder farmers, therefore, an evaluative overview of the organisational structure for the programme is presented.

### *Organisational structure*

The GSFP, along with the coordination of all inputs, activities and outputs of the Collaborating Ministries, is administered by the *Ministry of Local Government and Rural Development & Environment (MLGRDE)* as the ministry directly responsible for all development activities carried out at district and sub-district levels under the Local Government Act (Act 462). The MLGRDE is the oversight ministry for the GSFP, and government partner to funding agencies supporting the programme. Clearly this body seems also to have been unable to facilitate the involvement of local actors in the GSFP.

The *Programme (Steering) Committee (PSC)* is aimed at assisting the activities of collaborating ministries in relation to the implementation activities of the GSFP. At the time of the research, membership of the PSC consisted of the relevant ministers (chief directors or directors appointed as representatives by the Collaborating Ministries) and the Executive Director of the GSFP National Secretariat (who provided the direct programme link between each ministry and the GSFP). This was a strictly intra-governmental facilitating body.

The *Collaborating Ministries (CMs)* and *Ministry Departments and Agencies (MDAs)* at the time of the research consisted of the Ministry of Finance and Economic Planning (MoFEP), the Ministry of Food and Agriculture (MoFA), the Ministry of Education, Science and Sport (MoESS), the Ministry of Women's and Children's Affairs (MoWCA) and the Ministry of Health (MoH). These Collaborating Ministries (CMs), and MDAs were supposedly the core partners with the MLGRDE in the implementation of the GSFP. Although the ministers of these CMs or their representatives were supposed to serve on the PSC, however, in practice some of them (MoH, MoWCA and MoFA) were not very active in the GSFP implementation. Field investigations showed that the Ministry of Food and Agriculture (MoFA) was not involved at all in the implementation of GSFP, which obviously constrained market access by smallholder farmers.

The *GSFP National Secretariat (NS)* was the programme implementation structure under the MLGRDE. It was staffed by senior experts and consultants under contract enabling the Secretariat to function as a programme coordinating and management unit (PCMU) for all aspects of the school feeding initiative. The NS gave technical oversight and support for district level implementing structures (DICs, SICs, below), advising on programme content and implementing sensitization and outreach programmes. The NS also assisted with the capacity building needs of district level structures, executing and coordinating national level procurement, ensuring programme accountability and reporting, and providing technical and

policy inputs to the MLGRDE and PSC. The NS was headed by an executive director (who was also a member of the PSC). Given the top-down organisational structure of GSFP, systemic responsibility for operational failures at local level may be laid at the door of this body.

The *GSFP Regional Coordination Office (RCO)* is staffed by a Regional Coordinator (RC), supporting monitors and secretariat to oversee district coordinators at the DIC level. It should play a key role in ensuring accountability and reporting upward. The *Office of the Regional Coordinating Council (ORCC)* assists with *harmonization and coordination* of District Assembly (DA) development activities. This body is tasked with providing direct support for the GSFP Regional Coordination Offices, providing linkage with district leadership and facilitating RCO coordination efforts.

The *District Assembly (DA)* is the core implementing body for the GSFP. DAs were responsible for establishing the District Implementation Committees (DICs) and were supposed to ensure that the School Implementation Committees (SICs) were properly set up with adequate infrastructure. DAs are also responsible for coordination of other district level MDA activities and community support mobilization regarding input supplies to SICs and the schools, although, as Afoakwa (2010: 4) notes, they were given no guidelines about how to do this (other than to aim to procure locally grown food). The DAs are also in charge of programme funding at the district level and supposed to ensure transparency and accountability in the use of the funds. In several respects, this level of the GSFP administration would appear not to have delivered the service assigned – in large part, it may be suggested, because they were established by central government, without any local input.

The *District Implementation Committees (DICs)* are the coordinating units for the GSFP at district level. DICs have direct oversight responsibility over all the schools in the programme, are entrusted with the direct disbursement of funds to the SICs, and hold the SIC accountable for usage of funds for feeding and related activities. DICs are also supposed to implement bulk purchases at the district level in order to benefit from economies of scale, a role clearly in considerable tension with the practicalities of access for smallholders. Their management role appears to emphasise financial control rather than realisation of core programme objectives.

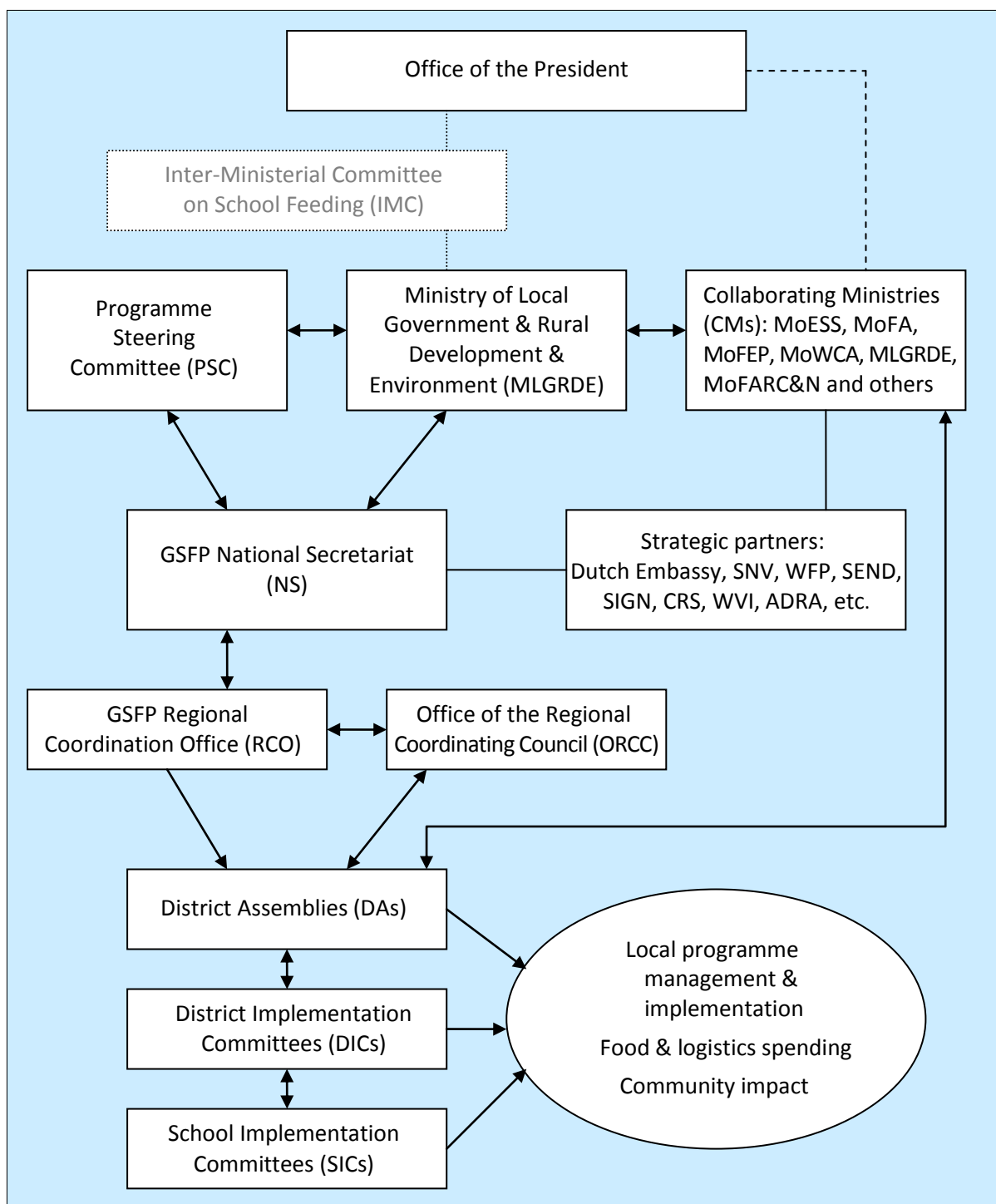
The *School Implementation Committee (SICs)* are the school level implementing units responsible for planning and executing the menu and actual feeding, as well as local food purchases. Accountable to the DIC, the SICs are responsible for procuring required inputs and supervising the food preparation and feeding activities. They consist of local community members (the ultimate beneficiaries) and the school executives, and were supposed to lead community mobilization to support and sustain the feeding programme. The role of the school PTAs<sup>27</sup> was observed to be crucial here.

SICs are meant to provide the frontline for the programme objective to build food security at community level through linkage between the school feeding initiative and community level

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<sup>27</sup> PTAs: parent-teacher associations, which involve parents in school organisation, activities, etc.





**Figure 5.2** GSFP actors and their inter-relationships at implementation<sup>28</sup>

<sup>28</sup> This is a slightly modified version of the chart given by Afoakwa (2010: 3).

wealth creation activities including value added farming. They are intended to be at the forefront of sustainability initiatives, starting with innovation in arrangements to conduct the feeding in the least costly manner (within the parameters of local sourcing), which has included piloting community- and/or parent-assisted strategies to purchase locally produced food stuffs and to do the actual cooking. In many ways, therefore, this is the key institution within the GSFP organisational structure. The observation in this case study, however, was that in practice the SICs were either not functioning properly – due to inadequate capacity to organise food stuff purchases – or just non-existent. From the schools surveyed, the district assemblies never channelled funds through the SICs for local food purchases. Given the crucial role of the SICs in facilitating smallholder access to the local GSFP market, the ability of farmers to profit from the school feeding scheme was obviously severely hampered by the inefficiencies in SIC operations.<sup>29</sup>

## 5.4 Empirical findings

### *Overview of the GFSP*

The principle findings of the research undertaken as described above (5.2) are outlined here as four main points. Broadly, they confirm and give further detail on the issues already raised.

1) Most of the actors in the organisation of the GSFP *lacked clear description of their roles and responsibilities*. Despite an impressive bureaucratic setting and a large commitment of governmental agencies to the programme, the primary lower level (district and local) institutions, DICs and SICs, were given no specific strategies on how to achieve linkages between local production and the GSFP market. The DICs and SICs responsible for community support mobilization and expected to involve local communities including smallholder farmers in the programme and empower them in decision making were given little support or direction as to how to achieve these. In fact, both DICs and SICs were found to be either dysfunctional or not functioning at all.

2) In almost all the districts surveyed *community involvement in the implementation of the GSFP regarding market access was low*. Respondents had heard about the programme either from the media or through personal observation, but the extent of knowledge about programme implementation and management was scanty. Other than the school PTAs, there

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<sup>29</sup> Other Ghana School Feeding Programme Partners (GSFP PARTNERS) and External Support Agencies (ESAs) included the Dutch Government (as the Dutch Embassy) which co-funded the GSFP with the Government of Ghana (GoG); SIGN (School feeding Initiative Ghana Netherlands), a semi-governmental organisation established shortly before the ten-school pilot project to link financial and other support from the Netherlands to Ghana in 2005; SNV (the Netherlands Development Organisation), a Dutch international charity aimed at poverty reduction; and SEND (originally the Ghanaian based: Social Enterprise Development Foundation of West Africa), a consolidation of NGOs organised as SEND Ghana, SEND Liberia and SEND Sierra Leone. Other GSFP strategic and technical partners implementing or supporting the implementation of school feeding programmes in Ghana included Catholic Relief Services (CRS), the World Food Programme (WFP), World Vision International (WVI) and donors like USAID supporting in areas such as water, sanitation and school infrastructure. More recently, support has come from the UK Partnership for Child Development, which promotes policies and expertise in agricultural sectors, and the Bill and Melinda Gates Foundation.

was little evidence of any engagement with RSGs. This was reflected in survey results. Overall, only fifteen percent of respondents perceived a high level of involvement of community members in the decision making and management of the GSFP.<sup>30</sup> This finding reflects the fact that the GSFP was not implemented well at local level – or, that it was not fully designed with a bottom-up approach. The involvement of intended beneficiaries in programme design was therefore limited in what could be described as an *expert thinkers' approach to development*, i.e. somewhat grand and abstract, and rather removed from socio-economic realities on the ground, i.e. at the local level of actual communities.

3) Contrary to the implementation plan, *decisions* pertaining to procurement mechanisms, management of school menu and food quality were not fully decentralized. DICs, the district level coordinating units that exercise direct oversight over all the schools in GSFP, were found in all the surveyed communities; SICs, however, the school level implementing units that plan and execute actual feeding, were not. These were either absent or not functioning. In principle, if the programme was linked to agricultural development, then, in addition to PTA members and school executives, SICs ought to consist of local community members (RSGs), who are mostly farmers and ultimate beneficiaries. This was found not to be the case. Without a high level of well-organised community involvement, the SICs cannot mobilize community support, empower local communities in decision making, or promote domestic production for the GSFP market (see also Chikezie 2007, Walker et al. 2005, Barret 2008, Markelova et al 2009, Markelova et al 2010). It was evident that community food purchases become difficult without the SICs. On the whole, only fifteen percent of the 400 people interviewed rated the involvement of community members in the decision making and management of GSFP as high. Community members, mostly small-scale farmers, were not given control (agency) in GSFP design and implementation, an approach that directly informed the (non-)operation of the programme in terms of smallholder involvement.

4) Thus, the *GSFP market was inaccessible to a majority of smallholder farmers*. The research confirmed the conclusions of the GSFP monitoring report in 2008, in which it was revealed that only two out of thirty, or seven percent of district assemblies (DAs) monitored or facilitated farmers' access to the market created through GSFP (PM&E-GSFP 2008). In view of these disappointing results the GSFP secretariat was challenged by donors and strategic partners to ensure accountability and transparency in programme implementation.

One analysis of the problem here is that the objectives of improving health, education and agricultural productivity all in one project are over ambitious. For instance, Bennett (2003) argues that main difficulties with school feeding programmes in general have been the complexities of objectives; some objectives tend to suffer for others to succeed. In the face of the overriding urgency of the malnutrition problem, the holistic HGSF approach can easily become reduced to food delivery, regardless of where the food comes from. A programme is also more likely to be successful if its aims are uncontroversial. Agreement, for example, on the idea of getting food to children at school in poor, rural areas in order to aid nutrition and

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<sup>30</sup> Perception of community involvement in GSFP by district: Manya Krobo, 7%; Kassena Nankana, 10%; Tolon Kumbungu, 10%; Mfantseman, 28%.

support education must be just about unanimous. The speed of achievement is also important for any programme, and governments and donors in particular can be expected to desire the various benefits of rapid, easily measured results, such as the number of children in class. In all of these respects, the attempt to use local smallholder-based rural development for food sovereignty, as re-forging community production-consumption linkages so as to strengthen long-term food security, is likely to come off second best.

A response to this argument would be that this is precisely why the community based approach of localized development is necessary. Only with a more genuinely democratic (participatory) approach, that is, do long-term, multi-objective holistic approaches that can really make an impact on people's lives by restructuring iniquitous social relations have a chance of real success – as determined, that is, by more profound measures, such as for food sovereignty (otherwise, simple, single issue, short term approaches may indeed be the realistic – least bad – option). This in turn would imply a radical reappraisal of the current GSFP if the third goal of rural stimulus is not to be forsaken.

### *Improving the GSFP*

During a presentation at a Meet-the-Press series in Accra in July 2008, the GSFP national coordinator discussed the challenges that the programme was encountering. It was explained that more efforts had to be directed at *closer collaboration with strategic partners*, and a *clearer description of roles and responsibilities* of each partner needed spelling out in a Memorandum of Understanding (MoU). To improve market access for smallholder farmers, the GSFP secretariat signed MoUs with various strategic partners including the Organic School Garden Project Agro/Eco/Goan<sup>31</sup>, the Millennium Villages Project (MVP)<sup>32</sup> and International Centre for Soil Fertility and Agricultural development (IFDC)<sup>33</sup>. These new initiatives by the GSFP implementers clearly revealed a sense of the need to develop an RSG oriented approach, with strategies to create opportunities to work with organised farmer groups in the communities.

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<sup>31</sup> **Organic School Garden Project by Agro-Eco/Goan:** OxfamNovib initiated the Organic School Garden Project in ten selected farming communities (including Tolon-Kumbungo) in Ghana in 2008. About forty farmers in each participating community were supported in vegetable (cabbage, tomato, French bean) cultivation using organic farming methods (using manure and neem extracts as biological pesticide). Market linkages were supposed to be established with the GSFP and the hospitality industry. School pupils also used the organic gardens for educational purposes, as intended in the GSFP goals.

<sup>32</sup> **Millennium Villages Project:** Developed by scientists at Columbia University and the United Millennium Project, the Millennium Village (MVP) concept comprises an integrated, community level development strategy to end extreme rural poverty. At the time of the study, it was being implemented in twelve African countries including Nigeria, Kenya and Senegal as well as Ghana, with interventions in the area of nutrition, agriculture, gender, education, health and the environment. In Ghana, a model village in Bonsaso (Amansie West District, in the Ashanti Region) was adopted under the project for agricultural development. Farmers received seed and fertiliser support from the project and in return donated ten percent of their produce to selected participating schools in the district. The MVP was also supposed to provide kitchen facilities and capacity building for the cooks to ensure food safety.

<sup>33</sup> **IFDC:** The GSFP Secretariat signed an MoU with the International Centre for Soil Fertility and Agricultural Development (IFDC) to develop theoretical supply chain models that would link school purchases with local farmers' organisations. The IFDC was also supposed to share ways of utilizing market information systems to facilitate market access with GSFP secretariat.

Starting at local level in the case of the Agro/Eco/Goan and MVP projects, these strategic non-governmental partners are better placed to build the capacity of the local small-scale farmers to produce for GSFP. Nevertheless, these strategic partners also need more effective and better functioning of the SICs of the GSFP for an effective collaboration with farmer groups in their respective communities for local food purchases. This requires a vision of the opportunities for a *restructuring of the GSFP*.

Implemented through the office of the President as a special Initiative, the GSFP was probably used for political patronage. According to De Hauwere (2008), administrative efficiency and financial accountability have been compromised, and school targeting linked to areas supporting the ruling party rather than poverty. Linked to this is the phenomenon of the ‘micro-macro gap’ (van Reesch 2007) in which national policies fail at local level as a result of national and regional socio-political systems. In the GSFP case, 70% of funds actually went to the richest regions, to the detriment of the poorer, northern part of the country. The direct cause of this mismatch in funding-to-needs would appear to be the GSFP system of district selection for the programme, which is linked to population densities (Ubels et al. 2008), since the three northern regions have high proportions of disadvantaged, marginalized, remote and poor communities with low population densities. Forced by the Dutch government withdrawal of funding, a 2011 restructuring has led to a retargeting of deprived schools/areas.<sup>34</sup> Nevertheless, the fact remains that while systemic policy problems like this may be the result of simple incompetence or political machination, more profoundly, they may also be understood to emerge as a function of social disempowerment.

The empirical findings of this research reveal that the shortcomings in the operation of the GSFP are related to the way in which it has been installed, as discussed, and the presence of asymmetric power relations among the various RSGs as will be considered. First, however, the next section gives the results of a socio-economic assessment study of the impact of the GSFP on the one group of smallholder farmers in the districts surveyed who did have access to the market created through school feeding. This demonstrates the potential that this holistic approach does have to develop the link between market access by small-holder farmers and their household food sovereignty situation. The results of this socio-economic assessment, of enhanced income and household food provision through GSFP market access, support the relevancy of a better functioning programme.

#### *Impact study of market access for rice farmers in the Upper East Region*

A socio-economic assessment of the impact of market access for small-holder farmers was conducted on rice farmers at the ICOUR<sup>35</sup> Tono irrigation site in Kassena Nankana District, in the Upper East Region. The rice farmers had been organised into groups to facilitate access to credit, production inputs and market. This research covers the impact of local market access on their incomes, household food availability and food sovereignty.

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<sup>34</sup> <http://www.ghana.gov.gh/index.php/news/general-news/12301-gsfp-to-expand-programme->

<sup>35</sup> The Irrigation Company of Upper Region, a governmental organisation established to manage the irrigation scheme linked to the five-kilometre long Tono Dam.

One of the main cash crops cultivated in the Tono Irrigation Project (the others being soybean and tomato), rice has become an important staple in Ghana and features prominently in the GSFP menu (Fig. 5.3). Although rice can be produced in Ghana it is largely imported, with imported rice constituting about 75% of local consumption (Quaye et al. 2007). The local capacity to produce rice is generally low due to high production costs, lack of access to credit and irrigation facilities, the unavailability of suitable varieties, low quality and poor access to markets (Furuya & Sakurai 2003, Adolph & Chancellor 2006). Consumption of milled rice in Ghana increased six-fold between 1983 and 2003, from below 100,000mt to over 600,000mt (MOFA 2007). Estimated levels of per capita consumption of rice in Ghana were 13.9, 14.5 and 15.1 in 1995, 2000 and 2007 respectively (MOFA 2007). Because of the rice deficit situation in Ghana – 173900mt, 212600mt and 215200mt in 2004, 2005 and 2006 respectively (MOFA 2007) – the Kassena Nankana rice farmers were given assistance to increase production and access the local market, which was enabled through ICOUR.

The rice farmers interviewed in the district were members of the ICOUR’s nucleus out-growers farming scheme.<sup>36</sup> These organised farmers’ groups received credit, extension and technical assistance in the form of production inputs through ICOUR from the Agricultural Development Bank (a state-owned development and commercial bank). In collaboration with farmers, the project provided a guaranteed market for rice production. Rice purchased by ICOUR was then sold to GSFP food contractors/suppliers, thus linking local rice supply to the demand created through the GSFP. Although there was no direct linkage between the rice farmers and GSFP, the market for rice production under ICOUR was guaranteed and the necessary production input supports given. This suggests the obvious observation, thus far unstated, that (other) farmers in GSFP participating communities could be better organised and supported – with similar production inputs and access to credit along with marketing links to the GSFP – something which might be achieved in collaboration with other strategic partners, such as MoFA and NGOs. The capacities of existing farmer group initiatives should be leveraged through effective collaborations

- School Menu in Asitey Presby in Manya Krobo District**
1. **Waakye** (Rice and Beans) with fish stew once per week
  2. **Plain rice** with **fish stew** twice per week
  3. **Yam/gari** and **beans** twice a week
  4. **Banku** (steamed fermented cassava and maize dough) with **okro stew** once a week

**Figure 5.3** Sample GSFP school menu

<sup>36</sup> A locally centralized system aimed at providing production and marketing services to farmers on their own land: ‘Sixteen Village Committees have been formed and developed to become responsible for land allocation to small-scale farmers and to become involved in the distribution/control of irrigation water at field level. Each farmer is allocated a 0.2 to 0.6 ha plot... Farmers have to contribute to the costs of services and maintenance by payment of a Project Levy (rains cropping season) and an Irrigation Levy (dry season). Credit is available for farm inputs such as fertilizers, feeds and fingerlings.’ (FAO 2012: 4.3). Available at <http://www.fao.org/docrep>

The impact of the Kassena Nankana farmers' access to market is analysed here in terms of production increase, income changes and the general food sovereignty situation. First, the total rice production of the 100 farmers interviewed in the district had increased from 3,228 85kg bags in 2006 to 4,167 bags in 2007, an improvement of some 30%. According to the farmers interviewed, the increment was due to a combination of credit access, technical assistance and the (GSFP) market provided by ICOUR. Second, farmers' incomes from rice production had risen by 80%, from almost US\$80,000 in 2006 to over US\$144,000 in 2007. The increase in the farmers' incomes was attributed mainly to the secured local market access and partly to soaring global food prices at the time. Simulation results from research conducted on small-scale irrigation in Upper East Region also indicated substantial increases in income and consumption levels of households with access to irrigation facilities and credit (Swamikannu and Berger, 2009). Third, the food sovereignty situation of the rice farmers interviewed is assessed here in terms of Household Food Availability (HFA) and Months of Adequate Food Provisioning (MAFP). The HFA describes the household food security situation on a four point scale,<sup>37</sup> while the MAFP is defined as the time between stock depletion and the next harvest (Bilinsky and Swindale, 2007).



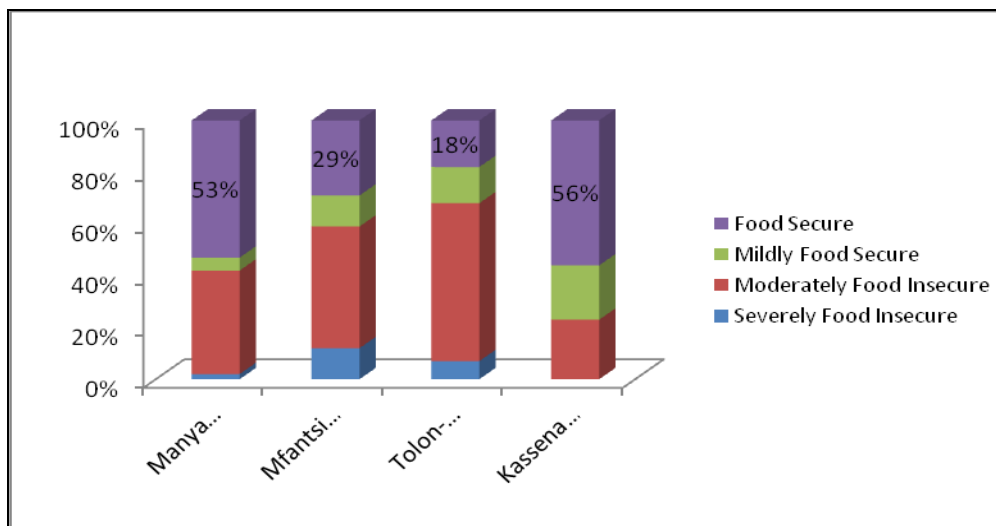
**Figure 5.4** Local Rice processors at work in Navrongo

It should be emphasised that HFA and MAFP are food security (i.e. not food sovereignty) assessment tools, and used here as proxies for food sovereignty. Rosset (2006) distinguishes between the concepts of food security and food sovereignty in terms of the means of getting food on the table (for a household). Under conventional food security policies, food is deemed as a tradable commodity that can be produced anywhere, anyhow, whereas from the food sovereignty perspective access to food is a human right which should be not only healthy and culturally appropriate but also locally produced if possible: while the source of food is not relevant for conventional food security, it is in food sovereignty. The sources of food consumed in the households of farmers interviewed were thus also investigated, as proposed in Bell-Sheeter's (2004) food sovereignty descriptive assessment tool.<sup>38</sup>

<sup>37</sup> A measurement tool developed by FANTA/FAO, the Household Food Insecurity Access Scale (HFIAS), comprises nine questions about food-related experiences of households when facing inadequate access to food. In this scale, a household's food sovereignty situation is described as 'food secure', 'mildly food secure', 'moderately food insecure' or 'severely food insecure', depending on the total score obtained from responses to nine statements regarding (1) Worry about adequate food for the household, (2) No food to eat in the household, (3) Inability to eat preferred foods, (4) Eating disliked foods, (5) Eating a limited variety of foods, (6) Eating smaller meals, (7) Eating fewer meals, (8) Household members going to sleep hungry at night, and (9) Household members going a whole day and night without food.

<sup>38</sup> Created in the context of native (North) American communities through the Colorado based First Nations Development Institute (FNDI), and recognising that the specific means of building food sovereignty is unique to each local food system, this technical assistance tool is designed to assist communities in performing a community food assessment, with information about local food systems and the cultural significance of local agricultural traditions, and exercises for communities to examine the economic impact of their agricultural

Access to production inputs and the GSFP market for rice producers organised by ICOUR in the Kassena Nankana district was found to have had a great influence on household food security. For the nine-factor measure related to basic food consumption patterns (Footnote 18), respondents in Kassena Nankana had the highest food-secured households of the four districts studied here (i.e. as compared to the Tolon Kumbungu, Manya Krobo and Mfantseman), with levels for all categories in the ‘food secure’ higher and ‘food insecure’ lower than the other district case studies, and (the only case of) no severe food insecurity at all (Fig. 5.5). Relating this just to change within the district (the comparison being over time rather than with other places), findings from this study also revealed that approximately 74% of the respondents in Kassena Nankana had experienced an improvement in household food availability following the ICOUR input and market access implementation, 24% did not experience any change, while just 2% reported a decrease in household food availability (probably due to factors other than market access).

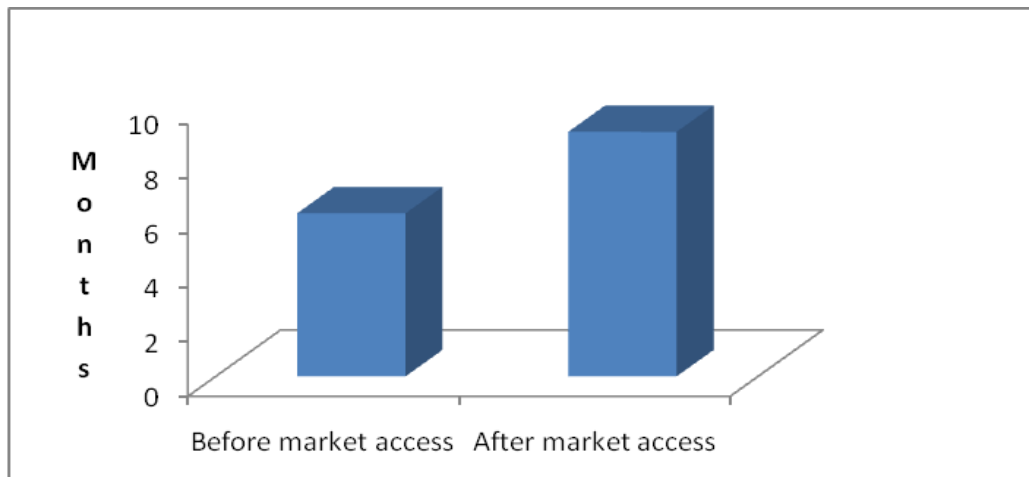


**Figure 5.5** Food security situation of farmer households in the four case-study districts

Regarding the household food stock measure, the number of months of adequate food provisioning reported by respondents in the Kassena Nankana district increased by a half, from six to nine months, following access to production resources and GSFP market organised by ICOUR (Figure 5.6).

assets. (See also the FNDI 2004 Annual Report, available at [http://epub.sub.uni-hamburg.de/epub/volltexte/2011/3343/pdf/2004annual\\_report\\_with\\_cover1.pdf](http://epub.sub.uni-hamburg.de/epub/volltexte/2011/3343/pdf/2004annual_report_with_cover1.pdf).)





**Figure 5.6** Months of adequate household food provisioning (Kassena Nankana)

Regarding the specifically food sovereignty measure of food source, a significant amount of the food consumed in Kassena Nankana was grown in the locality. About 31% of households sampled ate food *solely* from their own farm, throughout the year, while 58% of interviewed households sourced locally produced food when household stocks run out. Apparently rice was a staple food in the study area, and the rice farmers generally reserved some rice for home consumption. The local organisation, external support and market provision (GSFP) thus enabled smallholders a degree of independence, by delivering a financial income but not in such a way as to leave them bereft of their own produce as a food source.

## 5.5 Analysis

### *Lessons learnt*

Two socially important experiences can be drawn from this study relating to how the GSFP has been organised, in ways, that is, that either facilitate or constrain access to the GSFP market by smallholder farmers and the concrete impact of GSFP market access where it is present for food sovereignty. First, it is clear from the empirical findings in relation to decision making during the conceptualization and implementation processes that the participation of RSGs in the GSFP participating communities was not encouraged. Therefore, although the DICs and SICs were supposed to mobilize community resources and involvement in the GSFP, this did not occur. The interests of smallholder farmers were thus generally ignored, their needs unmet, and the third target of the programme, related to rural socio-economics, largely unachieved.

In the case of the rice farmers who did have access to the local market created through GSFP, however, there was a striking empowerment to take up the GSFP market opportunity. That is, a concrete effort was made to facilitate the smallholder GSFP market access by taking into consideration the link between the local farming practices and market accessibility and then facilitating this linkage by giving the necessary support, in the form of the provision of i) credit, extension and technical assistance in the form of production inputs, and ii) a vehicle to guarantee sale of produce (a market, in fact, a structured trading link to the GSFP).

The success recorded in this second experience contrasts with the more general failure of the first precisely because of the top-down approach that defined the organisational framework established, which is based on and further solidifies social marginalization and disempowerment. In the case of the GSFP, proactive information generation – such as through outreach community sensitization programming – and infrastructural base provision – such as through smallholder empowerment in local level organisation – were plainly lacking. It is therefore vital that communities are involved in the setting up of a renewed GSFP built upon the concrete practices of smallholder farmers – for which purpose the relevant asymmetric relations need to be understood and challenged.

### *Asymmetric relations in the GSFP and procurement models*

The GSFP has been built upon a complex bureaucratic, top-down structure in which RSGs responsible for community involvement have been largely neglected. The SICs and DICs, the ‘infrastructural base’ through which this would be realised, were not in fact empowered with organisational support to allow them to function properly in terms of mobilizing community farmers for local food purchases as expected in the GSFP implementation plan. On the contrary, a sharp contrast appeared between the explicit objectives of the GSFP to stimulate the market access of smallholder farmers and the actual reality that this market access was low in almost all districts surveyed. The initial research reveals that a *lack of community involvement*, particularly of smallholder farmers in the GSFP conceptualization and implementation, which was confirmed by the empirical findings indicating that in all the districts surveyed only fifteen percent of the (400) respondents perceived a high level of involvement of community members in the decision making and management of GSFP.<sup>39</sup>

The lack of community involvement in the GSFP was also manifested in the survey finding that, as the school level implementing unit supposed to plan and execute actual school feeding, *SICs are either absent or not functioning*. It is evident that community food purchases become difficult without the active role of SICs. Market access by smallholder farmers to the neighbouring schools (that is, the market created through the GSFP) depends on the ways in which the food purchases are organised; it is precisely in these *food procurement models* that the *asymmetric relations between RSGs become evident*. Three different models can be distinguished, in which the various degrees of community involvement in food purchasing is manifested. In the following, I first look at each of these models, then compare them, and finally consider the constraints and asymmetric relations that have influenced the choice of a particular food procurement model. Table 5.1 summarizes the empirical findings in terms of the procurement models used in the GSFP schools surveyed.

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<sup>39</sup> It is recognised as a highly positive development, therefore, that farmers’ associations were listed as among the ‘key stakeholders’ at a recent (April 2012) procurement meeting at Akim Oda (Eastern Region), and, apparently, as signatories to the subsequent MoU programming food purchases in part to ‘boost eating what is grown in a particular community’. At <http://www.modernghana.com/news/392336/1/ecasard-and-gsfp-interact-with-stakeholders-of-fee.html>.

**Table 5.1** Summary of procurement mechanisms in surveyed communities

District	Procurement mechanism	Extent of control of GSFP market access
<b>Manya Krobo</b>	Supplier model	Supplier may decide to buy from participating community farmers; however, food purchases were mostly made from traders due to credit arrangements and convenience. Community farmers not given direct access to and control of the GSFP market. Some community women taken on as cooks.
<b>Mfantiman</b>	Caterer model	GSFP caterers responsible for raw material purchases made at the district markets. No binding agreements signed with caterers to purchase from local farmers. Local farmers lacked direct market access due to resource constraints.
<b>Tolon Kumbungu</b>	Supplier and school-based models	Some involvement of local farmers through GSFP community vegetable garden; however, this involvement was limited, since the bulk of raw materials had to be supplied by food contractors who usually purchased from market centres.
<b>Kassena Nankana</b>	Supplier model	Bulk of raw materials supplied by food contractors but actual cooking done on school premises. Local farmers not given direct market access but were able to access GSFP market indirectly through ICOUR marketing arrangements with local food contractors.
<b>Akwapim South</b>	Caterer model	GSFP caterers responsible for raw material purchases done at the district markets. No binding agreements signed with caterers to purchase from local farmers. Local farmers lacked control and direct market access due to resource constraints.
<b>Akwapim North</b>	Caterer model	GSFP caterers responsible for raw material purchases. No binding agreements signed with caterers to purchase from local farmers.

#### Caterer model

In the *Caterer Model*, food purchases are handled by *contracted qualified caterers* who buy and cook food at central kitchens for a number of schools and present invoices to the DAs for payment on a weekly basis. From this study, the arrangement under the caterer model was found to be more convenient in urban and sub-urban communities, where local communities were relatively apathetic and more difficult to organise into SICs. There was *hardly any role for the school authorities or the local community*, which was a big disadvantage from the perspective of local market access. Power was thus invested in the caterer to purchase foodstuffs. It was also realised that the caterers were *not obliged to purchase foodstuffs from the local farmers*. This structurally sidelined those least able to take advantage of the opportunities afforded by GSFP that is the subsistence farmers who were supposed to be its beneficiaries. In denying the role of the disempowered, the asymmetric relations of power

enabled smallholders to be rendered structurally invisible even to caterers. Nevertheless, the caterer model was operating in all the districts surveyed, sometimes in combination with the supplier model (below) for raw material provisioning. The caterers were found to be better organised with bigger operations than the suppliers. They hired and paid staff responsible for cooking and serving the meals in schools. They also operated from known premises and could be easily located, which again was not always the case with suppliers. They were not observed, however, to be placing special emphasis on local produce, let alone smallholder farmers.

### Supplier model

The *Supplier Model* employs the use of contractors or suppliers to supply food items to the schools. The supplier may be a registered company (sole proprietorship) or an unregistered business run by an individual. Under the contract, the supplier buys the food (from any available and affordable outlets), delivers to the beneficiary schools on a weekly basis and then submits invoices to the DA for payment. The actual cooking is done on the school premises. The weekly supplies depend on the weekly requests sent by head teachers to DAs. *The sources of raw materials for food preparations are unspecified*, so it is difficult to comment on the involvement of small-scale farmers – or even domestic producers – in the participating communities. The empowerment of small-scale farmers and facilitation of their access to the GSFP market is not guaranteed with the supplier model because it does not involve the SICs. Again, *suppliers are not obliged to purchase from local smallholder farmers*. There is no contractual agreement regarding the sources of foodstuffs purchased for meal preparation. Assuming contracted suppliers are primarily motivated by profit, then obviously they will supply schools with the cheapest acceptable foodstuffs they can acquire, regardless of origin.

### School-based model

The *School-Based Model* is the ideal regarding small-scale farmer – GSFP market linkages. It is the most sustainable approach, *involving full community participation*. Analytically, asymmetric power relations are consciously contested through the empowerment of local level actors who are peripheral to the hegemonic structure of state in what might be described as a form of radical democratization. Through a well functioning SIC, this model ensures that food supplies first come from the community if available. Outside markets are only resorted to when the community does not have the capacity to produce and decides to buy in, from elsewhere. The community becomes responsible for food preparation and may choose to make cost savings arrangements by involving community members or parent-assisted strategies to do the actual cooking. Community gardens can also be established for school feeding (parallel to the school farms, where they exist). The school-based model was partially in evidence at Tolon Kumbungu, where the GFSP school had a community vegetable garden to support school feeding, but this was heavily complemented with the supplier model.

Despite the opportunities to enhance the community involvement in the GSFP as well as local food purchases that, in principle, the school-based model offers, the research revealed that

this model was rarely employed. This was principally because within the GSFP structure, inefficiencies in SICs translated directly into limited community involvement and, thence, lack of market access for smallholder farmers. None of the DAs in any of the districts surveyed supported the SICs to function effectively. *The SICs were not given organisational support to mobilize community farmers nor funds to purchase from these farmers.* This explains why community involvement was so low. In the school-based model local resource mobilization and community ownership is paramount, but this was lacking in almost all the communities surveyed. In the absence of effective SICs to mobilize food purchases from local farmers, *traders and food suppliers used their relative financial power to take advantage of the market created through GSFP.*

### Comparison of the three food procurement models

Comparing the three food procurement models (Table 5.2), the advantages of both the caterer and supplier model include convenience for school authorities (which allow them to concentrate on education) and the possibility of pre-financing arrangements (which helps to address some of the problems associated with fund release delays). Local actors' involvement and sustainability, however, are lacking. The school-based model, in contrast, is designed to involve local community members in food purchasing. It is the most attuned of the three procurement mechanisms to local market access on the part of small-holder farmers (followed by the caterer model, and then the supplier model), effectively assuming asymmetric power relations as a point of reference for (re)organisation. The lack of a single, full school-based procurement model in all the communities surveyed coupled with constraints due to late release of funds and credit purchases explained why the majority of small-scale farmers did not have access to the GSFP market at the time of this survey.

**Table 5.2** Comparison of the different procurement models used in the GSFP

Type of model	Asymmetric relations and extent of GSFP market access by small-holder farmers
<b>Supplier model</b>	Here the supplier makes decisions on where to purchase food items, either from the farmers in the GSFP participating communities or from other sources outside the communities. As per the GSFP design and implementation plan, there are no rules and obligations on where to buy food which rather empower the suppliers to make decisions to the disadvantage of small-scale farmers. Food purchases mostly done from traders outside the communities, who can allow for credit arrangement, and sometimes also due to convenience. Instead of local small-scale farmers accessing the market created through school feeding as planned, the inefficiencies in the implementation of GSFP give room for traders and middlemen to use their money and resources as forms of power to access the GSFP market. Traders and middlemen can supply food to GSFP on credit, which is not possible for farmers with urgent cash needs. Delays in release of funds (also due to the bureaucratic structures in the GSFP design) rather facilitate access to the GSFP market by a minority of prosperous traders and middlemen.

<p><b>Caterer model</b></p>	<p>Just like the supplier model, the caterer’s model also empowers the caterers to make decisions on where to buy food for the GSFP without rules or obligations. No binding agreement signed with caterers to purchase from local farmers. Lack of clarity on where to buy food coupled with delays in the release of funds for food purchases favours food purchases by caterers from traders and middlemen better placed to supply food on credit. Local farmers lack direct market access due to resource constraints to supply food on credit basis. With the use of the caterer’s model, the obvious assumption was that food purchases from local small-scale farmers will be executed without any binding agreement on this condition. However, it is apparent that the way the caterers view their roles in the GSFP contributes to the limited involvement of local farmers. Although most caterers are aware of the poverty reduction objective of the programme, they see themselves solely as food providers for the school children rather than partners responsible for achieving GSFP-smallholder farmers’ linkages. Consequently, caterers look for the most economic and efficient way to provide the meals, with the practical benefits of buying food from the market and suppliers largely explaining the way food is purchased.</p>
<p><b>School-based models</b></p>	<p>This model was found to be partially implemented in Tolon Kumbungu through the GSFP community vegetable garden. Although the school-based procurement model may be the most appropriate for realising the objectives of the GSFP, the caterer and supplier model have taken the lead in the purchasing of food. Indeed, there are asymmetric relations reflected in the political biased functioning of the GSFP fuelled by other constraints like late release of funds and possibility of credit purchases that influence the choice for alternative food procurement models. The school-based models are not utilized for food procurement because of the non-existence or malfunctioning of SICs and DICs, the bodies responsible for mobilizing local resources for local production-consumption linkages through school feeding.</p>

*Further constraints*

This research also shows that alongside the disadvantages associated with low community involvement and tendency to assume caterer model,<sup>40</sup> there are other constraints which hamper the further implementation of the school-based food procurement model. The following discussion considers some of these additional constraints to GSFP market access by smallholder farmers.

Roles and responsibilities in GSFP design

Asymmetric relations in the GSFP are reflected in the lack of clarity and enforcement of roles and responsibilities of RSGs in the GSFP programme design. For example, the DICs and

<sup>40</sup> Made by Afoakwa (2010), as well as at Akim Oda.

SICs, which were supposed to mobilize local food purchases and ideally through the most school-based model which would be most likely to offer a vehicle for the representation and empowerment of RSGs, were either absent or dysfunctional. Therefore, the alternative choices of caterer and supplier models were used in most of the schools visited, and there were no binding agreements and obligations for caterers and suppliers to purchase food from the communities. In respect of the poorly or non-functioning local GSFP instituted actors, the SICs were said in some instances to have been involved in identifying local farmers and linking them to the schools, but this tended to be only at the initial phase of the programme (this also applied to PTAs, operating with SICs or alone). The programme design stated that the SICs and MoFA would play a role in the development of farmer-GSFP market relations, but this had not happened.<sup>41</sup>

In the GSFP design, MoFA was supposed to support the linkage between the GSFP and the local farmers. It was envisaged that MoFA agricultural extension officers working in the field could identify and support small-scale farmers in relation to dissemination of improved technologies and extension services. MoFA was also tasked with assisting in marketing agricultural produce by way of management and information provision about the existence of the GSFP market opportunity. In practice however, MoFA had not been a collaborating partner in the GSFP implementation. The results from this study suggest that the main challenge in relation to MoFA's involvement lies at the district level. Due to the widespread malfunctioning of the DICs, MoFA was not included in the implementation of the programme. This is also an implied criticism of MoFA's organisation at district level, because that could (should) be the body to pressure the GSFP on this issue, presumably through the Programme Steering Committee (PSC). Linked to lack of clarity of the roles and responsibilities of the DICs and SICs is the lack of clarity in general on how (which, to what extent, in what ways) RSGs are to be involved and in particular how smallholder farmers in particular can (might) access the local market created through school feeding.

Smallholder farmers were not empowered to access the GSFP market. They gained some entry through the role that emerged for PTAs, but structural failings to integrate smallholders into the organisational set-up left the RSG of suppliers much better represented. This is to be regretted. Smallholder farming system in rural communities is mainly at the subsistence level. About 30% of the households interviewed in all surveyed areas depended solely on their own farms for food provisioning throughout the year, and close to 60% of households interviewed sourced locally grown foods when their own household foods run out. The small-scale farming system thus plays a major social role in household food provision and as a means to generate incomes from food surpluses when possible. From the food sovereignty perspective, this strongly supports the need for renewed GSFP design and implementation as an opportunity for endogenous developments.

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<sup>41</sup> The development at Akim Oda suggests a way forward through MoUs that may avoid SICs in procurement issues. The test of how this will actually operate in that case is extended by the issue of its wider application: to what extent will this be replicated for a reasonably well functioning GSFP from the smallholder access perspective overall, as opposed to a barely acceptable patchwork of success and failure, or worse, just a few isolated cases of success?

Besides this lack of clarity in roles and responsibilities of the relevant social groups, there were other constraints limiting local market access by the small-scale farmers in the GSFP communities, including late release of funds and credit purchases, as well as proximity and convenience associated with purchases from traders and middlemen.

#### Late release of funds

An important reason that not only makes it difficult for caterers to buy from local farmers, but also limits smooth functioning of the overall programme, was found to be the late release of funds. This could be partly attributed to the heavily bureaucratic structure of GSFP. In all cases studied, the DAs did not receive the money for the GSFP in a timely fashion. Consequently, they could not pay the caterers properly, which led to major problems in buying food. In Akwapim-South, the DA sometimes had to pay caterers with their own money. A similar situation was found in Akwapim-North district. In Dangme-East, people at the DA explained that they did not have the money to help caterers when the funds were received late. Clearly, there was a breakdown of the initial assumption that funds would be readily available for food purchases from local farmers. This became wrapped up in problems around transparency.<sup>42</sup>

#### Credit purchases from suppliers

The late release of funds for school feeding made credit purchases by caterers very attractive. Virtually all caterers had developed personal market relations with traders who had enough trust (saw the caterers, ultimately backed by the state, as sufficiently creditworthy) to allow for credit purchases when necessary. Getting credit purchases from local farmers, however, was much more difficult, due to their own urgent needs for cash. Since farmers want and are often in need of ready money, buying on the market rather than directly from source was thus more attractive for caterers (indeed, often enough, it seemed, the only practical option available to maintain their operation). Similarly, the limited credit possibilities in the communities made it more attractive for the caterers to purchase food from well-resourced suppliers outside the communities, either individual people or companies. In Akwapim-South, the DA explained that they had to support caterer purchases as intermediaries since it had become so difficult for the caterers to deal directly with the suppliers. These suppliers would sometimes prefer to deal with institutions that could guarantee their payment, and thus the DA had to become involved. Rice was bought from the Ghana Rice Company, cowpea and groundnuts were ordered from Northern Ghana. Buying on credit was found to be relatively expensive, which of course becomes an ongoing constraint in itself.

#### Proximity and convenience

Another limiting factor was found to be the difficulty in accessing local farmers. For some caterers, buying food from other sources, such as at district markets or through suppliers (the latter sometimes via the DA) proved to be more practical than buying from the community farmers. This issue was more pronounced in the urban and semi-urban areas where farming

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<sup>42</sup> See footnote 11, above.



communities were largely separated from kitchen centres. This again emphasises the need for smallholder farmer organisation – here, especially in respect of marketing and distribution outside their localities to GSFP schools in urban areas. Since there was no agency in place to facilitate (urban) marketing or system to promote such, caterers found bulk purchases from traders and middlemen more reliable, convenient and timely than buying in small quantities from widely dispersed farmers.

Despite many efforts to boost rural development through the GSFP, the survey findings reported here along with other programme evaluations conducted in recent years have showed no significant positive impacts on the production levels of farmers and their incomes (SEND Ghana 2008, WFP, 2007b). A comprehensive field study (‘national inventory’) carried out by SNV showed that the target of spending at least 80% of food expenditures on local products was not met – in fact, the 2007 performance on this count stood woefully low, at around 20%, a quarter of the target (SNV, 2008). However, although linking local consumption to local production through the GSFP has not yet been successful, it cannot be said to have completely failed either. There has at least been a 20% local produce input into the GSFP – but obviously much more needs to be done. The following subsection focuses on recommendations for practical measures intended to create opportunities for further improvement.

## **5.5 Opportunities for restructuring the GSFP**

The achievement of progress in local production-consumption linkages through the GSFP cannot be expected by a restructuring of the national bureaucratic apparatus of the programme alone. The approach within the GSFP needs to change. This can best be effected, I would argue, by empowering RSGs that have been excluded from the GSFP and/or by giving some of the actors already involved new roles and responsibilities as elaborated below.

### *Organising farmers*

In contrast with the philosophy underpinning the establishment of the GSFP, a bottom-up approach starts at the level of RSGs, in this case the farmers, or small-scale farming households. This study suggests farmer organisation to be a necessary condition of GSFP success in terms of market access, insofar as the one successful case studied, that of the rice farmers at Navrongo, Upper East Region, was premised precisely on their organisation (through ICOUR). It is imperative that existing farmers’ organisations are incorporated into GSFP, especially at the planning stage of new initiatives during the new phase of operations following the 2011 funding crisis and organisational revision.

An obvious body to work with here is the Farmers Organization Network in Ghana (FONG), structured as an apex body of over 70 farmers’ organisations with more than 5000 members.<sup>43</sup> Established in 2003 and growing, FONG focuses on agricultural development, economic growth and sustainable use of natural resources, emphasizing food security and

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<sup>43</sup> See <http://www.agricord.org/farmersorganisations/organisation/15517/farmers-organization-network-in-ghana>.

with a very strong representation of (uneducated) rural women.<sup>44</sup> On this last point, it might be noted that the involvement of women, well known as a criterion for success in development programmes, is particularly pertinent given that half of Ghana's farmers are female. Given the national presence of FONG, an obvious move (and implicit challenge to the asymmetric relations of power) would be to organise the GSFP with this body as an equal partner with in decision making with MoFA, perhaps through a reconstituted NS.

### *Strengthening the roles of local bodies*

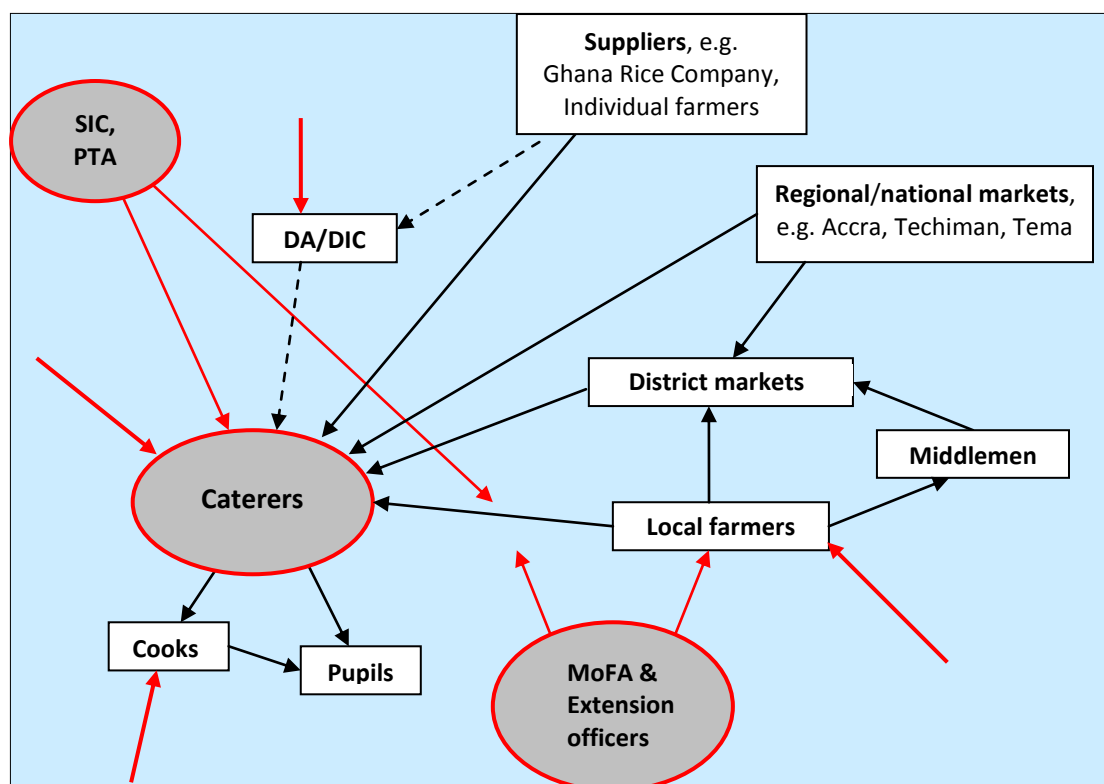
From the farmers, we move up to the local level of organisations present in the GSFH system. There, the results of this study show that the SICs and DICs were not functioning. According to Punt (2009) also, opportunities for improvement regarding SIC and DIC functions are limited. A proposal is made to either strengthen their roles and responsibilities or shift these to other actors in the GSFP food network. Given the national structuring already in place, the first of these is the more realistic option, entailing that the national organisation of the programme attempts to ensure better functioning through detailed national guidelines for best practice combined with stricter monitoring (including local upstream accountability requirements, such as to report on SIC composition and DIC meetings).<sup>45</sup>

The Ghana Education Service (GES), in addition to providing the official enrolment figures of the schools for the fund distribution, could also be involved in monitoring sources of food purchases. For example in Akwapim-South it was mentioned that educational health officers also checked the kitchens and hygiene conditions of schools. As their daily activities already include visiting and monitoring the schools they could play a greater role in monitoring food purchases and encouraging caterers to buy from local farmers. The possibility exists for GES to be responsible for setting up DICs and calling meetings instead of the DAs. Making another institution responsible for the DICs may facilitate their functioning. In comparison with DICs, SICs have more potential to become successful functioning committees. One possibility would be to pay the members for their work in the GSFP. Although this would be costly, it could be money well spent. Another possibility is to involve PTAs in financing. PTAs should certainly be empowered to make decisions and enforce or possibly monitor sources of food purchases where practicable. Figure 5.7 presents the local food network in the GSFP and the actors who might be strengthened to facilitate small-scale farmer – GSFP market linkages. The red arrows and circles indicate areas where the network can be strengthened to improve market relations between the programme caterers and the local (smallholder) farmers in the beneficiary communities.

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<sup>44</sup> The President of FONG is Dr. King David Amoah, who is also National Coordinator for the Akim Oda MoU NGO partner, the Muslim-Christian partnership The Ecumenical Association for Sustainable Agriculture and Rural Development (ECASARD). See <http://ecasard.org/>, and also <http://www.dailykos.com/news/Ecumenical%20Association%20for%20Sustainable%20Agriculture%20and%20Rural%20Development>.

<sup>45</sup> This echoes the pronouncement coming from Akim Oda: 'The aim is to draw on the best practices and standardize the operations and management of the GSFP in the purchases of food items'. Again, the issue is how (if not through DICs/SICs)? Here, appeal was reportedly made to the key stakeholders – listed as MoFA and GSFP caterers in addition to the farmers' associations – in the local DA.



**Figure 5.7** Local level GSFP food network (adapted from Punt, 2009), indicating actors and relationships that might be strengthened to promote smallholder access (red outlines/arrows)

#### *Contract agreements with caterers specifying local purchases*

The empirical findings reported here and confirmed by Punt (2009) indicate that the caterers interviewed were found to be motivated and capable women whose main goal was feeding the children. Many of them understood, and could explain when asked, the benefits the GSFP can have for the farmers in the community. A proposal is thus made also to directly instruct caterers to buy from the community farmers in their contract agreements.<sup>46</sup> Their awareness about the role of local farmers in the GSFP could be improved through training and educating them on their key role here (that since they are the demand side of the GSFP, success or failure in this respect is based on how food purchases are made). Clear guidelines suggesting how contact is made with farmers, explaining how to make agreements with them, advising on how to base the menu on local products etc., could also assist caterers to better execute their extended responsibilities. Where local farmers' groups are already organised, the caterers should be working with them for GSFP food procurement. Figure 5.7 thus places the caterer's role as central to strengthening the farmer-GSFP linkage. The caterer could buy directly from the local farmers where possible, if they are easily located and able to provide the quantities needed. Alternatively, where farmers are not well organised, the SICs could

<sup>46</sup> The Akim Oda MoU was reportedly signed to ensure this very thing, that GSFP caterers purchase from local farmers.

assist caterers in locating farmers who would like to sell to the GSFP. Caterers could also be linked to farmer groups by MoFA, FONG and other NGOs working with farmer groups through contract arrangements as discussed below.

#### *MoFA, extension officers and collaboration with other partners*

Connected to strengthening the DICs at DA level is the role that the Ministry of Food and Agriculture (MoFA) should play in the GSFP. As mentioned, MoFA played no significant role in the programme's implementation, and it continues to have no significant involvement in the ongoing local level operations. While there is no need to further complicate government department involvement in the upper administration, at local level input plurality can be a positive, giving more networking options. From the interviews with extension officers and the District Agricultural Development Unit (DADU) directors, it was clear that enabling farmers to access the potential market of the GSFP could be part of their responsibilities. The DADU extension officers may be best placed among the state representatives to link farmers to the programme. The logical next step is to suggest that the District Agricultural Development Departments be involved in the implementation and running of the GSFP programme at the district level (through the DAs and/or DICs).

A rather late proposal was made for programme implementers to focus on strategic partners that could help local farmers gain access to the GSFP market. Management of the GSFP should continue to develop these, as in the cases of Agro-Eco/Goan and the Millennium Villages Project. Strengthening ties with existing institutions in the rural/agricultural sector can improve efficiency. NGOs working with caterers may also contribute to extending GSFP-farmer links.

## **5.6 Conclusions**

This research shows that although the GSFP has the potential of linking local food production-consumption for enhanced market access by smallholder farmers, there are structural and asymmetric relations challenges. Despite the good intentions of decentralizing decisions pertaining to the GSFP, this research rather reveals a top-down bureaucratic approach to programme conceptualization and implementation. The GSFP has been implemented with negligible involvement of the small-holder farmers who are supposed to benefit from the market created through school feeding. At the local level of organisation, the DICs and SICs responsible for community support mobilization and enabling linkage of smallholder farmers to the GSFP market were given *little support* or direction on their roles and responsibilities, as well as lack of funds for local food purchases. In short, the fundamental power asymmetry whereby governmental agencies determined the actual conceptualisation of HGSF in Ghana through the implementation of the GSFP also entailed the non-involvement of end users in the initiation of the programme.

Three procurement models – the supplier, caterer and school-based – have been identified. The latter appears to warrant 'best practice' status for the purposes of linking smallholder farmers to the market created through school feeding, but is found to be rarely used due to the

malfunctioning of the DICs and SICs (itself a function of the fundamental power asymmetry). Other factors constraining small-holder farmers' access to GSFP market are late release of funds (which is also due to the bureaucratic structure of the GSFP), credit purchases from suppliers (which was not possible with small-holder farmers due to their urgent need for cash payments), and proximity and inconvenience (related to urban markets and buying from small scale and widely spread farmers), as well as general lack of enforcement of roles and responsibilities in the GSFP design. As a consequence, the long term goal of improving small-farmers' market access through the school feeding programme, thereby contributing to poverty reduction and enhancing food sovereignty, has not been very successful.

This research thus points to emerging local initiatives and opportunities for farmers to access the GSFP market. Concrete proposals for restructuring the GSFP to facilitate local food production-consumption linkages spelt out in this study include i) strengthening collaboration efforts with farmers' organisations and strategic partners working with these; ii) focusing on implementation at local (district and community) level, by using various means to improve DICs and SICs (including through GES involvement and empowering PTAs); iii) focusing on the roles and responsibilities of actors (caterers) who have the capacity to develop farmer-GSFP linkages through performance contract agreements and regular monitoring; and iv) developing farmer access by involving MoFA at district level (primarily through DADU extension officers).

These suggestions do not necessarily amount to a single coherent plan or cohesive course of action, but they do rest on some clear working principles which combine to constitute a food sovereignty oriented approach. Smallholder farmer access to the GSFP market should be promoted in the interest of empowering rural households and more closely linking small-scale agricultural production to consumption; to this end, emphasis should be placed on local level implementation rather than national administration; in this emphasis, the involvement of farmers groups is crucial; the existing district and community (school) level organisational structures should be improved in which ever ways may be deemed practically most viable (such as those suggested, perhaps); and a multi-dimensional localised approach to linking RSGs, particularly farmers, to the programme should be assumed.

The basic thrust of these working principles should, it is hoped, function in a way that challenges the asymmetry of power which negates the interests of smallholders in the initial implementation and first phase of the GSFP. There are some signs that this may be beginning to occur, although they remain, as yet, few.

## CHAPTER SIX

### General discussion and conclusions

#### 6.1 Introduction

This thesis has set out to understand variety (technology) development and market access from a food sovereignty perspective. Access to agro-technological production resources, such as crop seed varieties, and domestic markets, including those created by specific programmes, on the part of smallholder farmers in agri-based economies, are issues of great concern to social movements agitating for the governance of world's agriculture and food production

Social movements grouped in Via Campesina defined food sovereignty in 1996 in terms of the right of peoples to safe and culturally nutritious food, access to production resources, ecological production practices and access to local markets (Desmarais 2002, Windfuhr 2005, Pimbert, McAfee 2008, McMichael 2008, Roling 2008, Rosset, 2008, Borras & Franco 2012, Rosset 2011). The social movements demand a reflection on the socially differentiating features inscribed in the current corporate food production and consumption systems, which generally favour the minority large-scale producers and deny small-scale farmers the opportunities to follow other trajectories for developing and maintaining their livelihoods (Desmarais 2007, Murphy 2008 and Trostle 2008).

A food sovereignty related issue that has impelled this socio-technical study is that of the *dis- and re-connection* of local food production and consumption systems as a result of unrestricted trade, which is gradually crowding out small-scale farmers from their domestic markets (Ruivenkamp 2005, Long 2007, Quaye 2007, Wittman 2009). It is with this in mind, therefore, that the research on variety (technology) development processes here has investigated constraints and possibilities for the re-construction of cowpea variety designs according to the needs of smallholder farmers, with its focus on facilitating access to domestic markets complimented by an investigation of the Ghana School Feeding Programme as another market access opportunity. The two pillars of this research – technology (cowpea variety) development and access to (cowpea and GFSP) domestic markets – have been studied from the perspective of food sovereignty. This implies that the study –based on the empirical findings about the actual technology and market developments – has searched for endogenous opportunities to enhance food provision particularly at the level of local markets and rural households.

This research has been carried out within the context of an international, multidisciplinary research programme entitled 'Tailoring Food Science and Technology to Endogenous Patterns of Local Food Supply for Future Nutrition' (Telfun). The programme was implemented in Ecuador and India in addition to Ghana/Benin, with each team composed of a plant breeder, food technologist, nutritionist and social scientist. The central theme of Telfun

was that of enhancing food sovereignty through strengthening local food networks organised around specific food crops: lupin, mungbean and cowpea, in Ecuador, India and Ghana/Benin, respectively. Cowpea was used as the reference crop for the Ghana/Benin research team as it has a socio-culturally and nutritionally defined role for alleviating poverty and malnutrition, especially among children, which could be strategically employed to better understand the opportunities for implementing food sovereignty in the Ghana/Benin context. The Ghana/Benin team investigated opportunities to improve existing cowpea varieties and cowpea based products for better nutrition together with local (small-scale) producers and processors as well as with consumers.

This study is the social science part of the multidisciplinary research programme and explores social relations in cowpea variety and market access development in the Ghanaian context. The core question of the research is:

*What roles do and can technology developments and market practices play in linking local production and consumption from the food sovereignty perspective?*

The sub-questions are:

1. How are cowpea production, processing and consumption practices socially organised in Ghana, and which opportunities can be identified for enhanced food sovereignty? (below, 6.2.1)
2. What are the cowpea preferences of different stakeholders (traders and consumers) in the Ghanaian domestic markets? (6.2.2)
3. How are cowpea breeding activities organised in Ghana, and to what extent have cowpea breeding programmes responded to domestic market demands (and can they in the future)? (6.2.3)
4. What is the role of the Ghana School Feeding Programme (GSFP) in linking local food production and consumption for enhanced market access by small-scale farmers and how might this be strengthened? (6.2.4)

The empirical research on the social organisation of cowpea production, processing and consumption was carried out in various communities located in the Tolon-Kumbungu district of the country's Northern Region in collaboration with the other scientists in the Ghana/Benin multidisciplinary research team. The study of consumer cowpea preferences as perceived by traders and consumers focused on eight markets in two cities, Accra and Kumasi, while the study of the GSFP oriented to smallholder market access was carried out in four districts in different regions in the north and south of Ghana (to which was added information from an MSc student study on two more districts).

The data collected by the Ghana/Benin multidisciplinary research team through this Coordinated Network Study have been used by all the four researchers in the team for their disciplinary oriented activities. For the social scientific analysis of the data, a critical-(re)constructivist approach was applied, which involved the elaboration of two key

theoretical concepts: *technical code* and *relevant social groups* (RSGs). Both concepts deal *critically* with the power imbalances present in the design of cowpea variety developments and the degree of accessibility to domestic markets. The two concepts also contain a *constructive* aspect in the sense that they stimulate a reflection on opportunities for transforming these power imbalances through the involvement of other, currently neglected RSGs in cowpea design and GSFP market accessibility. The debate on food sovereignty has informed this study in its search for those empirical developments that indicate opportunities to improve the linkage between production and consumption at the local level.

This chapter first addresses the first four sub-questions (6.2) and the all-over key research problem (6.3), followed by possibilities for reconstructing social-technical codes in variety and market access (6.4) and a conclusion that reflect on the practice of a multidisciplinary research project and policy recommendations (6.5).

## **6.2 Addressing the research questions**

In this section I will synthesize the empirical research results in view of the applied theory and from a food sovereignty perspective. Four issues will be discussed critically, as determined by the first four sub-questions: the social organisation of cowpea production, processing and consumption, consumers' cowpea preferences, cowpea breeding activities and domestic market access through GSFP.

### *6.2.1 Social organisation of cowpea production, processing and consumption*

The Telfun multidisciplinary Coordinated Network Study engaged in the development of insights into the different variety preferences of relevant social groups (RSGs) and the complicated relations of these with the way that cowpea production, processing and consumption are organised in the Tolon-Kumbungu district (Chapter 2). In terms of *production*, the study revealed a *range of farming systems with different varietal preferences*. At one end of the spectrum there are subsistence farming systems focusing primarily on household food provision and using particularly local varieties and/or landraces, where the primary preference is for cowpea varieties with traits that support the provision of household food security. At the other end of the spectrum there are the entrepreneurial farming systems focused primarily on income generation and participating in domestic (national) and regional (African) markets, and whose preferred cowpea varieties are related to these. In between these two poles, there are farming systems that combine aspects of both systems and have their own specific preferences in cowpea trait and variety combinations.

In relation to the two basic purposes of cultivation –for household food provision or for sale – the empirical research showed that the small-scale farmers who focused on household food provision and building resilience to food insecurity preferred *early maturing* local varieties – for the provision of food during the pre-harvest ‘hunger period’ –which were *insect tolerant* and gave relatively good yields with *few or no agrochemical applications* (in view of the costs of these and the loss with their application of the cowpea plant leaves as a food source), and *white bean* varieties (which they perceived as being nutritious). These farmers also



indicated the relevance of *conserving genetic resources* – as a traditional activity and communal (ecological) responsibility – and *reproducing their own seed*– as a good in itself and economically advantageous. They complained about the ever increasing prices of the improved varieties that have to be purchased each year (with meagre financial resources) and resisted varieties that relied heavily on external inputs (which they could not afford). Farmers growing for the market, on the other hand, were able and prepared to make these financial investments in return for better yields. Smallholders combining both farming strategies typically focused on supplying household needs first and then selling any surplus, so their specific mix of variety preferences would tend to toward those related to subsistence rather than market farming.

The empirical research findings showed that, overall, the most preferred varietal traits for breeding considerations among smallholders are *high yield, tolerance to diseases and pests, and white bean colour* as well as *early maturation*. These are preferred in combination, which is to say that the desire for any one trait is not exclusive and that various balances might be more or less acceptable (for example, trade-offs between less high yield and greater tolerance). The research findings also made it clear that these technical functionalities need to be well-tuned to and integrated into the variety of farming systems with their different cultivation purposes. The closer a farming household to subsistence level, for example, the more important early maturation becomes. Generalising, local variety characteristics are preferred for household food consumption, while the improved cowpea varieties developed over the past two decades are preferred from the perspective of market value.

On the small-scale *processing side*– which includes production in domestic settings (standard urban kitchens) for locally consumed foods (below), as well as rural households which prepare cowpea for their own consumption – subtle differences in varietal preferences were observed. Processor trait preferences were found to depend either on the processing technique employed (as determined by the food produced) or else just on the food itself, which, in turn, distinguished commercial from household producers. This distinction is itself made in two ways: i) on the basis of the specific foods produced (insofar as some foods produced for household consumption are not produced for sale, or, conversely, commercial processing involves the concentration on a few foods as marketable products, while household processing covers a wider range of traditional foods); and ii) on the knowledge basis of the preference (insofar as householders make their own choices for themselves, whereas commercial processors choose according to their estimations of consumer demand, e.g. of the types of boiled beans that seem to appeal to the public).

The important criteria for the processor variety references were found to be *short cooking time* (essentially, hours required to boil the beans), *good whipping ability* (of the cowpea flour and water mix) and taste (of the beans and bean products). The research results showed that processors of *koose* and *tubani* considered good whipping ability to be important traits in their varietal choice, while those using cowpea for *waakye* and boiled beans selected for relatively short cooking time; and although it was learnt that white beans are generally chosen– the processor preference based on consumer demand (below) here corresponding to that of farmers as processor-consumers – the brown bean varieties are preferred for

*apprepensa*, for their taste. Commercial processor preferences found not to be based on the place of origin of the cowpea variety.

This research has also shown that it is possible to identify common preferences and make gross choices for focusing the breeding regime on specific traits preferred by majorities. In this case, white beans were found to be generally favoured by the different interests of each of the RSG categories (farmers, processors and consumers). The minority interest in brown bean varieties for *apprepensa* as an occasional food among rural households (Table 2.4), on the other hand, defines the position for brown bean in technical research as indicated by sociological factors: it should have a low priority, but it should not be completely ignored.<sup>47</sup> It should perhaps be clarified here that the claim for sociological considerations in the biotechnology of variety breeding does not demand that these are necessarily more important or need to be established first. Nor does the focus here on RSGs imply this to be the only socially oriented perspective: health considerations (nutrition), for example, are another.

Concerning the cowpea preferences by consumers, a more detailed study has been carried out and reported in Chapter 3 (below, 6.2.2). Concerning the *social organisation of cowpea consumption* in Ghana, the Coordinated Network Study noted the development of street foods and the evident popularity of *koose* and also *waakye*, especially among young people. These street foods increase the competitiveness of locally cultivated crops like cowpea in comparison to foreign foods like fried rice and breads with derived from foodstuffs on global markets and therefore stimulate a re-connection of local food production and consumption. The street foods represent a potential for developing what have been called *glocal foods* (Appadurai 2008).

Glocal foods combine the global and local in a variety of ways for the development of unique (location specific) food products. In this case, the global ideology of fast food symbolized by MacDonalD's is endogenized by street food consumption practices built upon Ghanaian dishes. These foods – *koose* and also *waakye* sold by street vendors and resulting from the interaction and mixture of global and local interests and ingredients – are developing in Ghana as niches of strongly interrelated production and consumption patterns, and according to which the variety traits of food crops may themselves be developed.<sup>48</sup>

From this exploratory study of the social organisation of cowpea production, processing and consumption and the related meanings ascribed to cowpea varietal choices, the relevance of RSG variety preference to variety development is apparent (which is the starting point for Chapter 4, below 6.2.3). Several other opportunities for enhancing food sovereignty have also been indicated in the course of the research, however, particularly for the small-scale,

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<sup>47</sup> This is just an example to establish the principle, of course. Based on the single Tolon-Kumbungu case study, it hardly represents a sufficient scientific base for wider (regional, national) generalization, a geographical point that holds also for time: the complex array of factors does not stay fixed (tastes change, for example), and research on trait preferences for variety development needs regular renewal.

<sup>48</sup> Indeed, in reference to the global consumer preferences in which food products are disconnected from local contexts and traded on global markets, the glocal may also go global (e.g. pizzas topped with Parmesan cheese).

subsistence farming systems. The following concrete suggestions resulting from this may be executed through an instalment of appropriate policy measures:

1. Conserve genetics resources, biodiversity and seed as important local resources;
2. Strengthen the role of farmers as custodians of genetic resources, their indigenous farming knowledge and their abilities to discern crop varieties able to withstand harsh and changing environmental conditions;
3. Revalue and improve cowpea's high nitrogen fixation rate as an important natural resource to be used socially in the variety of production systems;
4. Investigate opportunities for cropping system adaptations related to tolerance characteristics, early maturing varieties, low input requirements and self-pollinating seeds.

### 6.2.2 Consumer variety preferences

In collaboration with the plant breeder of the Ghana/Benin Telfun research team an analysis has been made of *consumer preferences*, as perceived by the traders and consumers themselves. From the food sovereignty perspective of linking local food production to consumption, the aim of this part of the research is to understand whether and in which ways consumer preferences for specific cowpea varieties can elucidate marketing concerns that may be incorporated in participatory cowpea variety development. This study thus extends and compliments the Coordinated Network Study (CNS) reported in Chapter 2 (above). Focusing on the small-scale activities of one rural district (Tolon-Kumbungu), the CNS comprises a case study that also encompasses two forms of rural consumption (of cowpea), those of subsistence farming households (outside the market) and of (food processing and production for) local street foods; this study, on the other hand, looks at bean sales, at (eight) outdoor markets in large urban areas (two cities, including the capital). This research is thus more focused, which makes it more limited in scope but also gives its findings greater empirical validity.

Empirical results show that consumers' preferences for specific cowpea varieties are based on their interpretation of *food desirable qualities*, which are *associated with variety* rather than on the place of origin (locally or foreign) of a variety (even though the variety may be known in name by its geographical source if it is imported, e.g. as 'Niger'). A sharp contrast in the social meanings of cowpea variety is evidenced by the choices of urban consumers – who see the cowpea varieties in terms of (beans/flour grains for) food preparation – as compared to the interpretations at production and rural processing level. The survey findings found the post-harvest aspects of grain cleanliness and level of weevil damage to be the most important issues. These were followed by the variety based (including processing) criteria of seed colour, cooking time, seed size and taste; dryness of the cowpea grain was ranked seventh and place of origin last of the eight characteristics surveyed.

Referring to the food desirable qualities, the survey also shows that foreign cowpea varieties are very popular on the markets surveyed, indeed markedly more so, it would seem, than domestic varieties (Table 3.1). This may be related to price (the imported varieties were a

little cheaper overall), but correlates better with bean colour. Over 80% of respondents stated a preference for white beans, while the combined preference for the different foreign origin beans as stated was nearer to 20% – and the foreign varieties were all shades of white. White beans coats are softer, making the beans easier (quicker) to cook, which seemed to account for the preference more than aesthetic qualities. This would imply that bean colour largely equates to cooking time, which the findings support (Table 3.3), and which of course, is highly pertinent not just to urban consumers with busy lives, but also to rural consumers and processors with limited means for cooking, or purposefully limiting them.<sup>49</sup> It also means that the processing advantage of white beans make these varieties more attractive to all RSGs, including the smallholder producers as household consumers. A single ‘super trait’ is thus identified, a common preference with obvious implications for breeding programmes (i.e. the consumer preference study confirms the findings of the CNS in this respect).

Nevertheless, the broader finding from these survey results are that consumer preference ranking is rather built upon the food desirable qualities than on the technical functionality of cowpea varieties observed at the production level study. Combining these results from Chapters 2 and 3, therefore, it becomes evident that there are *multiple meanings of what constitutes an improved cowpea variety* among RSGs – or, alternatively, that the social meanings (human value) of improved varieties are RSG dependent. Generalising, (the RSG categories of) farmers, processors and consumers have different interpretations of an improved cowpea variety. These differences may be specified in several, complex combinations. By way of example, three consumer RSGs are identified (subsistence smallholders, young rural street food buyers, and the women buying at urban markets), who have preferences both in common and distinct from each other (two prefer white beans, for example, which may be unimportant for the street food buyers) while other preferences may be incompatible (like the small but significant desire for red bean varieties noted among rural householders). This implies the question of how, on social grounds, variety traits are to be selected for – for which food sovereignty can act as a guiding principle.

The threat of the crowding out of small-scale farmers from their local/domestic markets by the influx of foreign cowpea varieties suggests that their seed preferences be given priority in breeding programmes. Or, the observed cowpea variation on the markets may be realised as an important local resource offering Ghanaian breeders the opportunity to exploit the range of foreign, local and improved varieties as a gene pool to develop further new varieties which can compete favourably with the original foreign varieties. Indeed, giving importance to consumer preferences can be another guiding principle for variety development. The recognised way to facilitate the introduction of concerns like these is for farmers as end users to be involved in variety development through participatory plant breeding (PPB): this research thus makes a clear plea to consider the role of traders and consumers in PPB, in fact, as equally crucial to that of farmers. This would be functionally useful insofar as it might contribute to a reversal of the trend of crowding out local farmers from their local/domestic markets through a better attuning of variety and local demands. By introducing consumer

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<sup>49</sup>Village consumers are keen not to expend unnecessary energy or meagre financial resources on labour intensive or relatively expensive fuel provision, while processors are motivated to keep fuel costs down.

preferences into breeding programmes alongside those of farmers, the newly developed varieties may become better adapted to the local climatic edaphic conditions as well as to the preferences of various local RSGs and generally tie consumption more closely to production.

The research findings support the idea that consumers (and processors and traders) as RSGs may play a critical-constructive role in variety development. A reconnection of breeding activities to domestic market – which may be viewed as implicit in the food sovereignty approach – demands requires new variety (technology) / market relations. A social reconstruction of cowpea variety (technology) is crucial for the maximization of consumer acceptability, which in turn can improve small-holder farmer access to domestic markets and thereby increase rural incomes for enhanced food sovereignty.

### *6.2.3 The social organisation of cowpea breeding and opportunities to respond to new market demands*

A (cowpea) variety development process organised toward meeting the needs of its end users should be expected to aim towards an ever more precise attuning of trait combinations to i) the differentiated farming production systems and ii) consumer preferences. This would result in a more efficient embedment of the improved varieties in the various production systems and in a greater match up of agricultural produce to market demand, which would in turn imply a better balance in research of the social-economic advantages in relation to expenditures. According to the research carried out here, the trait most desired, preferred by small-scale producers and processors and urban consumers alike, is that of bean colour. Overwhelmingly there was a desire for white bean varieties of cowpea. Yet, research reported here (Chapter 4) on cowpea variety development in Ghana over the past 20 years, showed that of ten new varieties released onto the domestic market, only three were white and half were not even light coloured; and in terms just of the seed needs of small-scale farmers, it is the (light) red colour varieties that are shown to exhibit the preferred trait of faster maturation, while none of three highest yielding varieties were white (one was cream, and the other two dark red and brown) (Table 4.3).

Having established the different preferences in cowpea variety development among various RSGs, the focus of the thesis thus moves to a (sociological) exploration of the failure of the nation's breeding programmes not only to factor in these multiple and diverse interpretative meanings into the development process, but not even to strongly emphasise the most basic requirement, for white bean varieties. The concern is thus to seek explanations for the mismatch between what farmers have been producing for sale on the domestic market and the preferred varietal choices of traders, processors and consumers which has led to farmers' loss of local/domestic market, and the apparent failure, moreover, even to produce varieties with traits that very closely matched the farmers' own preferences.

The research on Ghanaian cowpea variety development in Ghana during the period 1990-2010 shows that breeding has been *socially organised* in *three phases*: upstream breeding, downstream breeding, and validation and release. Empirical findings also reveal the *unequal*

*power relations* in the participation of different RSGs in cowpea variety development and the extent to which local variety needs are understood and addressed. Although, in principle, variety design options are open to various interpretative meanings of various RGSs, in practice, research findings have shown that the assumed flexibility in developing various is not evident and that breeding trajectories are rather closed. The closure of the cowpea breeding trajectory takes place through the development of new exotic lines in the upstream phase by international research institutions which influence also the decision-making in the downstream breeding phase (below). In other words, through the development and dissemination of new exotic lines the international centres also disseminate specific breeding standards and procedures which tend to sharply reduce the broad spectrum of various technology trajectories, and leave only a limited number effectively open as starting points for further investigation.

Against this, the research has also shown that the development of a wide variation of cowpea trait characteristics which are used for evaluation and adaptation in local environment facilitates are opening up, to some extent, the technology trajectories in which the exotic lines are selected, evaluated and adapted for local needs. However, and crucially it is argued, the research has also shown that although this on-farm multi-locational testing of promising lines guarantees a relatively high involvement of farmers in the downstream breeding phase, still these farmers' choices are constrained by the pre-established interpretations of exotic lines among the international breeders upstream. This in turn may be understood as a function of the way in which farmer's participate – in the later stages of variety development, only giving information rather than being treated as equals in agenda setting, etc. – which amounts to a participation in variety selection (PVS) rather than genuine plant breeding (PPB). But even this rather poor level of participation on the part of local farmers in downstream breeding activities is strong as compared to the non-involvement of other end-users of the new cowpea varieties, notably the small-scale processors, traders and consumers.

Concerning the validation and variety release phase of proposed improved varieties–performed by the National Varietal Release Committee (NVRC) – the research has shown that station variety trials and testing in farmers' fields are conducted based on the internationally defined standards of Distinctiveness, Uniformity and Stability (DUS). It is a gain recommended that representatives of consumers, processors and traders may be included, here, in the NVRC, for the release of market driven cowpea varieties.

This research on the organisation of cowpea breeding in Ghana confirms the concerns among participants in the food sovereignty debate that national breeding efforts can easily become separated from their local context and needs. The research shows that international breeding centres prescribe specific breeding standards and procedures for the national research institutions through the dissemination of new exotic lines at the downstream breeding phase. The assumed application of the international DUS standard for releasing new cowpea varieties itself raises concerns over whether breeding activities in Ghana are sufficiently attuned to local needs. For an effective interaction between technology developers and end-users at the early stages of varietal design, it is crucial to have local RSGs participating and

empowered in decision making throughout the varietal development process. There is no obvious reason why this should preclude testing standards.

Two concrete suggestions may be made here. First, the food sovereignty perspective on the third of the DUS criteria must be one of extreme suspicion. The 'S' for stability represents stability in performance for grain yield and other superior qualities across sites and locations, which i) assumes the emphasis on grain yield associated with market oriented as opposed to subsistence and most smallholder farming; and ii) implies a level of geographical/ecological homogeneity at odds with an emphasis on location (local conditions). In short, the scientific demand for repeatability seems to merge into the constructs of agribusiness, and the 'S' for stability becomes 'S' for standardization. It may be dispensed with.

A second suggestion derives from the observation that the DUS – or DU – criteria are technical, in the sense that they do not include social considerations. The 'D' (distinctiveness from existing improved varieties), and 'U' (uniformity in selected characteristics used in the variety description), say nothing about the goals and motivation of breeding. In order to introduce a social dimension, we may note that if there is a desire for a universal set of criteria, it must at least be flexible (adaptable to local specificities) and empowering (with a focus on smallholders and the needs of the poor).

Summarizing, a social reconstruction of the variety development process in Ghana is recommended. In addition to the review of procedural standards, proposals include

1. Enact institutional re-arrangements for the active participation of local researchers in upstream breeding activities conducted at international research organisation;
2. Set multi-targeted breeding frameworks with clear breeding objectives considering the RSG defined differences in variety preferences at production and consumption levels;
3. Fully integrate farmers, traders, processors and consumers into the breeding network to ensure effective input and feed-back communication between production (technology developers) and consumption (technology end-users) level RSGs.

#### *6.2.4 The role of the Ghana School Feeding Programme in linking production and consumption at local level*

An improvement in attuning cowpea variety development and domestic market relations is not only limited to an enhancement of the participation of still neglected RSGs in the varietal development process, but also requires a critical reflection on the possibilities for getting access to local/domestic markets by small-holder farmers. A necessary part of the framework for this may be set through the type of suggestions offered here (above), but these are not sufficient. One consideration is the type of market. In the face of the dominance of global trade and international corporations, one opportunity for food sovereignty oriented development lies in the creative use of new market linkages. Niche marketing and the fair

trade movement are well known examples; another is the Home Grown School Feeding movement (HGSF), introduced in Ghana as the Ghana School Feeding Programme (GSFP).

A market access study of the GSFP (Chapter 5) has been focused on the investigating whether and in which ways the GSFP functions as a catalyst for re-establishing social relations between small-holder farmers and local/domestic markets. The research aimed to indicate concrete opportunities for re-linking local food production and school feeding (local consumption) as facilitated by the nation-wide instalment of the GSFP. Although the GSFP monitoring report in 2008 revealed that only two out of thirty District Assemblies (DAs) monitored facilitated farmers' access to the market created through GSFP (PM& E-GSFP, 2008), still this study aspires to find out whether some openings can be found in the GSFP practices which are exemplary for enhancing the production-consumption relations at the local level, and whether a revision of organisational operation initiated in 2011 might be made to work in the interests of local farmers.

Key concerns from the GSFP practices are the different food procurement mechanisms. Three procurement models of the GSFP can be distinguished. The *Caterer Model* involves the handling of food purchases and food preparations by contracted qualified caterers. The caterers buy and cook food at central kitchens for a number of schools but are not obliged to purchase foodstuffs from local farmers. The *Supplier Model* involves the use of contractors or suppliers to supply food items to the schools. The supplier, which may be a registered company or an unregistered business run by an individual, buys the food from any available and affordable outlets and delivers them to the beneficiary schools on a weekly basis. The sources of raw materials for food preparations are unspecified and suppliers are not obliged to purchase from local smallholder farmers. Motivated by profit the suppliers will aim to supply schools with cheapest acceptable foodstuffs regardless of their place of origin. The *School-Based Model* involves community mobilization of resources and buying raw food stuffs from local farmers. This model implies a full community participation ensuring that food supplies first come from the local area, if available. The community becomes responsible for food purchase and preparation. Outside markets are only resorted to when the community does not have the capacity to produce and decides to buy in from elsewhere. The community may choose to make cost savings arrangements by involving community members or parent-assisted strategies to do the actual cooking.

Comparing the three models it is evident that the caterer and supplier models imply convenience for school authorities, create possibilities for pre-financing and simplify book-keeping but limit the involvement of the local producers. The school-based model, on the other hand, is precisely built upon strengthening links between the products of local smallholder farmers and the local markets (school kitchens), and through the reinforcement of these relations to boost further local food production and consumption. Although in the school-based model, community ownership and local resource mobilization are paramount, it was found to be rare among the communities surveyed, indicating that there are various kinds of social constraints which hinder a successful development of the school based food procurement model. Therefore, the study has also focused on investigating whether a *change*



*in approach* of the GSFP can be realised to empower the local producer-consumer relations, and which measures can be proposed for a *national restructuring* of the GSFP.

In order to increase the access of smallholder products to the local markets/school kitchens, the research shows that the GSFP may stimulate some of the already involved actors to acquire new roles and responsibilities, while other actors that have been excluded need to be included. In other words, the unequal power relations present in the GSFP need to be challenged to improve its functioning. For example, it has been suggested that School Implementation Committees (SICs) become involved in the actual planning and execution of school feeding and play a role in decisions pertaining to procurement mechanisms, management of school menus and food quality issues for the school children. Caterers and suppliers may also be instructed to buy from the community farmers in new contract agreements. One recent (2012) move in this direction is noted, at Akim Oda, in the country's Eastern Region, where a Memorandum of Understanding (MoU) has been signed with the stated aim that caterers purchase food items from small scale businesses.

The research has also shown that at the project conceptualization stage, the programme had been set-up in a top-down fashion and the involvement of subsistence farming systems in rural Ghana was overlooked. Concerning the restructuring of the GSFP it has also been suggested that other actors may be involved or get a more important role in the implementation and running of the GSFP such as the District Agricultural Development Unit extension officers, who should be able to link farmers and farmer organisations to the programme. The empirical findings also reveal concrete proposals for endogenizing the GSFP to facilitate the linkage between local food production and school feeding (local consumption). These include strengthening (i) collaboration efforts with strategic partners working with farmer groups such as ICOUR, the Millennium Villages and Organic School Garden Projects, (ii) social relations between farmers and caterers or school kitchen centres by involving MoFA, and (iii) roles and responsibilities of actors who have the capacity to develop farmer-GSFP linkages through performance contract agreements and regular monitoring.

Involvement of small-scale cowpea producers in the GSFP was not found, but a case of smallholder (rice growers) participation was located – in Kassena Nankana District, in the Upper East Region – and an impact study of market access for these farmers made. By all measures employed the effect of this new market link for the farmers was positive. Interviews showed that rice production and incomes had risen greatly; the Household Food Availability (HFA) and Months of Adequate Food Provisioning (MAFP) measures showed that over half the farmers felt food secure (around double that of farmers in three other districts surveyed for comparison) and that food stocks had increased by a half, and a food sovereignty measure showed that most farming households were eating locally produced food. Crucial to this success was i) the fact the farmers were organized, through ICOUR, and, ii) and that farmers received credit, extension and technical assistance (through ICOUR), which also guaranteed the market by buying the farmers' produce and selling it on to the GSFP.

The market access study focused on the Ghana School Feeding Programme has outlined some facilitating and constraining factors which affect the domestic market access by small-holder farmers. It has shown – similarly to the empirical findings from the technology studies – that the *unequal power relations* between different relevant social groups in the conceptualization of the GSFP and the food purchase models has and continues to influence the level of market access of local food products to the school food consumptions. In light of the potential for success evidenced at Kassena Nankana, the organisation of farmers is key. The importance of working with already existing farmers’ groups – left out of the original planning and subsequent implementation as a function of power asymmetry – cannot be overstated. As a concrete proposal, therefore, it is suggested that a major role – as an equal partner at national level – might be found for the Farmers Organization Network in Ghana (FONG), an apex body of over 70 farmers’ organisations with more than 5000 members nationwide, of whom a majority are women. Organising for inputs as at Kassena Nankana will also help to address the economic base of smallholder farmers and contribute to their food sovereignty situation.

### **6.3 The role of technology developments and market practices in linking production and consumption from the food sovereignty perspective**

This thesis has focussed on identifying opportunities for re-linking local food production and consumption in Ghana by applying and elaborating two social-scientific core concepts, namely *relevant social groups* (RSGs) (Bijker 1987 & 1995, Pinch and Bijker 1987, Rosen 1993) and *technical code* (Feenberg 1999, 2005, and Hamilton & Feenberg 2005). These two key theoretical concepts have been used here particularly to unravel power imbalances in levels of accessibility to domestic markets and stimulate a reflection on the opportunities for transforming this limited access and including disempowered groups in the focus areas of cowpea variety development and the GSFP. Conclusions elaborating on the role of these two concepts in this research are presented here.

#### *6.3.1 Identifying RSGs in cowpea variety development and the GSFP*

The concept of RSGs is used to investigate the interpretative meanings assigned to cowpea varietal preferences among social groups in the cowpea network at the (small-scale) production and processing (Chapter 2) and trading and (urban) consumption levels (Chapter 3). Having established the differences in social meanings for cowpea variety among the various RSGs, this research further explores how these differences have been factored into the past (and present) varietal development processes, as part of an explanation of the mismatch between what farmers produced for sale on the domestic market and the preferred varietal choice by traders, processors and consumers. In the analysis of the cowpea varietal development process (Chapter 4), the *technology developers* emerged as the RSG that, through initial technology designs and new exotic variety lines most influence the breeding goals set for further evaluation and selection downstream by local breeders and farmers. The empirical findings show that local researchers are not directly involved in the development of the new exotic lines from the international research centres and are ‘stimulated’ or even obliged to follow the standards and rules prescribed in the pre-established interpretations of

the exotic lines among the international breeders upstream. Alongside the technology-developers, two other RSG categories have been identified, the *end-users* including farmers, processors, consumers and traders and *intermediary groups*, such as donors, extension agents, administrators, government and NGOs working with farmers and others. These intermediary groups play an important role in the analysis of the GSFP while the group of end-users has been primarily relevant in the analysis of the cowpea variety development.

An important result of the research is that the empirical findings indicate clearly that within each category, particularly that of end-users, *various subgroups* need to be delineated. For example, the social group ‘farmers’ is often dealt with as a homogenous entity while the empirical findings indicate clearly how relevant it is to make a clear *differentiation* not only at the *level of operation* (large- or small-scale) but also related to the *specific context of operation*: it is not sufficient to refer to the subgroup small-scale farmers since it is crucial to make a further differentiation between small-scale farmers cultivating (e.g. cowpea) primarily for household food provision or for sale.

This sub-subgroup of small-scale farmers focusing on household food provisioning was treated as an RSG in the cowpea network insofar they were identified by a distinct position within it (defined by their subsistence farming). This RSG was found not to be primarily interested in high crop yields, but rather in a balance of high yield and diseases and pests tolerance as well as in cowpea taste for traditional dishes. With domestic food security needs in mind they tended to cultivate local varieties, whose high resistance to the harsh environmental changes and to diseases and pests meant that they had no need for agro-chemical applications which both had low cost implications and allowed the cowpea plant leaves to be used as vegetables in the local dishes. The empirical findings revealed that these small-scale farmers had to ensure that family needs were met first, before thinking about what to sell. The research also revealed that some of these small-scale farmers practiced mixed farming – in terms of crop type and variety – and treated improved varieties more as a means to provide some financial income from production surpluses. In other words, the empirical findings showed that farmers as an RSG requires a differentiation into subgroups, or a plurality of RSGs, and that on this basis, empirical research related to the level and specific context of operation, openings may be sought for enhancing their food sovereignty.

Considering another relevant social end-user subgroup – the small-scale rural processors - the research shows this RSG to interpret cowpea variety differently from farmers (in general) and that again even within this processors group there are differences in varietal preference depending on type of food processed. For example, processors of ‘*koose*’ and ‘*tubani*’ considered good whipping ability in their varietal choice, while those using cowpea for ‘*waakye*’ and ‘*boiled beans*’ selected for relatively short cooking time.

Having investigated and established the differences in social meanings for cowpea variety development among the various relevant (sub)categories and social (sub-)(sub)groups – for which ‘RSG’ is generally employed for simplicity’s sake – the research further explored whether and in which ways their different preferences have been introduced into Ghana’s cowpea variety development. The empirical findings indicate that the *extent of participation*

among the different RSGs varies enormously. The important role of international breeders is stressed and it is emphasised that although farmers are involved in the breeding activities downstream, (small-scale) farmers' choices are largely constrained by the pre-established interpretations of exotic lines among the international breeders upstream. The extent of participation by other end-users (processors, traders and consumers) in further clarification and stabilization of improved cowpea varieties is negligible. Interpretation of what an improved variety should be among traders, processors and consumers in the Ghanaian context might seem an obvious area to explore— surely it is —and yet also, it is clearly very easy to overlook or take for granted – because it has been. This apparent contradiction is explained by the idea of asymmetric power relations (below).

For the market access study (of the GSFP) it became evident that alongside the small-scale farmers, *intermediary groups* such as governmental and non-governmental organisations may also be conceived as RSGs. The research also shows that an enhanced smallholder access to domestic markets has not been realised by these intermediary groups. On the contrary the research indicated that – despite the overriding interest of the GSFP to enhance market access by small-holder farmers – all kinds of managerial and organisational problems had emerged among various governmental agencies which continue to hinder an enhanced small-holder access to domestic markets through the GSFP. The research clearly reveals that the involvement of various governmental agencies alone is not sufficient to realise an enhanced small-holder access to domestic market, and shows, rather, that there are all kinds of institutional and/or bureaucratic constraints that increase the difficulties for implementing an enhanced market access. These problems have been found to include the late release of funds due to the heavily bureaucratic structure of GSFP, irregular supply of funds and the credit purchase opportunities for suppliers that are not possible for local farmers. Indeed, the credit procurement mechanisms actually encouraged caterers and middlemen to source foodstuffs from convenient and credit markets, from sources, that is, other than farmers. This became manifest also in the dominance of the supplier and caterer food procurement models, in which food purchases for school feeding are made on the basis of availability and accessibility of local resources (as opposed to the school based model in which food purchases are made on the basis of supporting local smallholder farmers, and was found to be rather rare, as an actuality).

The market access study made clear the need to *integrate other relevant social entities and still neglected groups* into the design of the GSFP. In principle, the GSFP was designed to enhance market access by small-holder farmers in the process of increasing school enrolment through school feeding. Local community members, mostly small-scale farmers, however, are not empowered to participate in the decision making processes of the GSFP design and implementation, and it is precisely their needs which are overlooked by programme designers. Indeed, the GSFP programme has been largely successful in reaching its immediate objectives of increasing school enrolment and attendance, but unsuccessful in linking local farmers to supply food to the programme.

Another assumption that was made in the GSFP design is that the School Implementation Committees (SICs) would become responsible for procuring required inputs and supervising

the food preparation and feeding activities. These are supposed to consist of local community members and school executives who lead community mobilization to support and sustain the feeding programme. SICs are also intended to be at the forefront of sustainability initiatives, starting with innovation in arrangements to conduct the feeding in the least costly manner within the parameters of local sourcing. However, the research has shown that in practice the SICs are either not functioning properly, due to lack of capacity to organise foodstuff purchases, or are just nonexistent. From the schools surveyed, the empirical research reveals that the district assemblies (DAs) never channelled appropriate funds through the SICs for local food purchases. Given the crucial role of the SICs in facilitating smallholder access to the local GSFP market, which in the programme is practically neglected, it becomes clear that the ability of farmers to produce for the GSFP market is constrained by the limited role of SICs. Therefore, the research ends with a clear plea for changes in the institutional setting of the GSFP and for provision of active involvement of various neglected RSGs and institutions.

### 6.3.2 *Revealing the social-technical code in variety development and market access for small scale farmers*

#### a) A code analysis of the cowpea breeding programme

The analysis of the (lack of) involvement of RSGs in the cowpea variety development and in the design and practice of the GSFP has delivered insights into the constraints of technology and market development to re-link food production and consumption in Ghana. These constraints are fundamentally related to the power asymmetries in the social relations among the RSGs and other bodies.

In this research, the code concept has been used to unravel the *power asymmetries* among different RSGs involved in the technological design of cowpea variety development and in the accessibility to domestic markets. The code concept helped to develop a retrospective view on how cowpea varietal development has been organised over the last twenty years in Ghana and clarified the constraints on smallholder farmers' participating fully in the school feeding programmes. The code concept also stimulated reflection on opportunities *to reverse earlier choices* in variety designs for better variety-market relations and to *change the extent of participation* of various bodies in the design of the GSFP.

The research revealed that the power asymmetries among various RSGs in defining the cowpea variety development priorities are built upon and reproduced through specific *cultural assumptions* about variety preferences, breeding and market accessibility. These cultural assumptions underlie the choices in cowpea variety development that result in new breeds ('improved varieties') with specific characteristics and underlie a specific institutional (bureaucratic) and organisational (top-down) setting of the GSFP. Concerning the cowpea variety development, cultural assumptions have been questioned (Chapter 4), such as that farmers are supposed to know what consumers want and that they are interested in cowpea with market value. In contrast to these assumptions, the empirical findings reveal that farmers – being both farmers (engaged in / selling to the market) and consumers (subsisting with their produce providing for the household) – have differentiated preferences for varieties used for

their own consumption and those used for sale, and that these two different sets of variety preferences need to be considered at the upstream level (which does not occur).

At upstream level, the development of new cowpea lines led by breeders working within international centres implies cowpea varieties whose cultivation is assumed to be relatively unrestricted by location – almost certainly not to a single location-specific context. On the contrary, the intention is to breed varieties for *universal application*, largely driven by the socially vested interests of dominant actors on global markets. Universally applicable traits such as yield potential, tolerance or resistance to major biotic and abiotic stresses and early maturity are the commonly targeted traits at the conceptualization stage of breeding in these international centres. Consumer preferences are not. The concept of consumer rights might not seem very radical today, at least in the ‘developed’ world, but in the world of variety development they are strangely absent: consumers – ‘the public’ – are socially situated as a disempowered RSG in this context.

The *abstraction*– in the development – of new exotic cowpea lines from their location-specific context of application implies that cowpea-variety (technology) development is to some extent de-contextualized at the conceptualization stage which enables a practice of *standardizing* the procedures for variety development. At the moment that the technology developers look for varieties for universal application, the procedures for variety development may also become *standardized*. Indeed, the research has shown that these standardized procedures at upstream level prescribe specific kinds of data gathering which are required for further development of new cowpea lines at the downstream breeding phase and through the dissemination of these specific breeding standards and procedures *close* the broad spectrum of various technology trajectories to a limited number.

The standards and procedures in formal led variety breeding allow for proper coordination and comparison of results across countries. The *formalization* of the breeding system through the enforcement of standards and procedures contributes to a de-contextualized breeding. Indeed abstraction, standardization and formalization of breeding systems enable the breeders to come with *uniform representation* of the social goals to be tackled by the improved varieties. In short, the abstraction of new exotic cowpea lines from their local (Ghanaian) context by standardized variety targets and the formalization and enforcement of breeding procedures to be applied universally are all elements of a process through which the power asymmetries among relevant social groups are confirmed and through which the dominant position of the international breeding institutions is reproduced. This process which in the scientific literature has also been referred to as the externalization and scientification of agricultural research (Van der Ploeg 1986) leads to power asymmetries among relevant social groups and effectively incorporates the assumptions about variety preferences of dominant RSGs into the design of new cowpea varieties. That is, the incorporation of assumptions in the design of new varieties reflect the presence of politically biased social-technical code in the cowpea variety development. Thus, the assumption to emphasise yield at the cost of other traits and employing what for subsistence farmers are prohibitively expensive inputs.

The empirical findings also reveal that *the different extent of participation of various relevant social groups* in cowpea variety development – which illustrates the power asymmetries and shapes the politically biased content of cowpea breeding – is *maintained and reproduced* in several ways. Useful inputs or suggestions are provided through local researchers, extension agents and farmers at project inception workshops to change breeding objectives. However, this happens when exotic lines have already been constructed at the upstream breeding phase. The interactions and involvement of local researchers, extension officers and farmers in the social construction of an improved variety cannot alter the initial technical functionality and the social goals intended by the international breeders during the conceptualization stage.

Finally, in order to change the politically biased content in the cowpea variety development it is not sufficient to reconsider the extent of participation of various RSGs, as this should be done in connection with changes in the institutional setting of breeding and its prioritization of breeding goals. Not only other variety preferences need to be formulated by the still neglected relevant social groups, but also opportunities need to be created that these other ‘voices’ can be heard and particularly that these other voices can become integrated in the formulation of renewed cowpea variety breeding priorities. Thus, even the simple, generalized and overwhelming preference for white beans in Ghana gets missed.

This last issue requires another social procedure to formulate the breeding priorities. These should no longer be exclusively formulated or decided by the dominant international breeders but also in respect of what local RSGs consider as socially desirable targets. The research reveals two additional constraints here, however. First of all, even when smallholder farmers express the relevance of developing varieties for their household food provision and to produce their own seeds and to care for the use of leaves for specific local dishes, these voices are not captured in the breeding goals, which remain centred on yields, drought, insect, and pest and disease tolerance. This is not only related to the fact that these voices are marginal but also to the fact that – as explained above – the standard requirements and procedures set by the technology developers in international breeding centres influence processes at downstream breeding level and may thus marginalize these ‘voices’ because they do not fit in the existing practices. There might be a contradictory setting of requirements imposed by the standard breeding procedures and the realisation of other breeding targets as proposed by smallholder farmers or other relevant social groups. It may exactly be these contrasting requirements of the standard breeding procedures and the preferences of smallholder farmers for other breeding priorities which may make it problematic to realise a change in the cowpea variety development. This insight also leads to a critical reflection whenever an improvement of local varieties is presented and that these improved varieties maintain their traditional names. Due to the prescriptive influence of the breeding standards and procedures it need to be questioned whether and in which ways these improved varieties also contain assumptions in their technical designs which are still largely shaped by the technical functionality of the standardized breeding procedures.

Apart from the prescriptive influence of the breeding standards and procedures a second constraint in challenging the power asymmetries in cowpea breeding is that that local actors

have often *internalized* the standards and rules set by international research institutions and that their personal ambitions of being modern and professional are often translated into following the rules of these highly prestigious institutions. This illustrates that not only the extent but also the orientation of participation of the yet neglected but relevant social groups need to be reflected on before one can conclude that a change of the code in the cowpea breeding activities is realised.

Despite the presence of the constraints and complexities which reduce the opportunities for challenging the politically biased code in the cowpea breeding, the research also find that the construction of a cowpea variety does not stop at the door of the international breeding centres but continues through the successive stages in which the variety is further developed and released as an improved variety that circulates socially. It is exactly this continuous and iterative process of technical and societal developments in various phases of the design and release of the varieties which offers opportunities to shape and reshape the code of the cowpea varieties. The research reveals that even after the release of an improved cowpea variety to the public by the National Varietal Release Committee (NVRC) that decided on a supposedly stabilized variety, the variety is still *subjected to further social construction* by other end-users (notably processors and consumers) according to their interpretations of an improved variety. In other words, the representation of an improved variety – in which it is assumed that specific social goals will be realised – is constantly and socially reconstructed.

However, the research also reveals that it is important to acknowledge that the power asymmetries in the design of improved varieties are also reproduced and that there are constraints for a social (re)construction which is particularly endangered by the technical specifications imposed by breeding standards and variety release rules which represent the power asymmetries among relevant social groups (and therefore need to be clarified as tackled in this thesis). This implies a need for further research focussed on the question whether a social space (room for manoeuvre) exists – despite the presence of power asymmetries – to reconstruct the cowpea variety breeding in the various phases of downstream breeding and in the validation and release of cowpea varieties. In other words, whether and in which ways a recontextualization of cowpea breeding can be realised. Although such a research may be carried out in the near future, already some provisional ideas and reflections on the reconstruction of cowpea variety breeding can be formulated on basis of this research which will be discussed in the next paragraph, but first I will indicate how the code concept has also facilitated a critical analysis of the GSFP with its limited access of smallholder farmers to the school feeding markets.

#### b) A code analysis of the Ghana School Feeding Program

The study of the cowpea variety development reveals that the politically biased code in cowpea breeding is related to the unequal social relations among actors shaped by long-term processes like abstraction, standardization and formalization which empower particularly international breeding research institutions and disempower other social groups. The analysis of the limited accessibility to domestic markets by smallholder farmers in the GSFP also



reveals that this is related to the *power asymmetries in the organisation and formulation of the programme*.

The empirical findings show that power asymmetries among various social groups and institutions (bodies) exist where key bodies at the local level of the GSFP organisation –DAs, DICs and SICs – have been neglected at the conceptualization and implementation stage, and where food procurement models emerge which decrease the opportunities for smallholder farmers to supply the school kitchens in their neighbourhoods. The research reveals that the organisation of the GSFP is built upon socio-cultural assumptions underlying the institutional framework of the GSFP which hamper the instalment of an efficient school feeding system. Efficient organisation and management of school feeding programme are supposed to be accomplished through involving, strengthening and implementing specific social relations (see also Alvesson & Willmott 1996, and Scott 1998). However, instead of supporting they rather contributed to hamper an efficient school feeding system.

The research has also shown that at the project conceptualization stage, the contextual situation of subsistence farming systems in rural Ghana was ‘out of sight’; that the top-down programme set up was essentially an abstraction. For example, it had been genuinely assumed that farmers in the GSFP participating communities could just produce enough food for school feeding. In reality, small-scale farmers cannot always provide enough food and are often operating individually, widely spread, having low capacities and are poorly resourced. The one ‘success story’ located notably operated with a pre-organised support structure for the farmers and major inputs of varying kinds and ongoing support with produce purchase, which enabled large production volume increases.

The abstracting tendency of the set-up derived from the asymmetric, top-down conceptualization and implementation of the GSFP is also evident in the failure to consider variations in the farming practices across the different ecological zones in Ghana (see also Gokah 2008, Eenboom and Becx 2009, Quaye et al. 2010). For example, northern Ghana produces close to 70% of its domestic rice demand, so supplying rice for the programme is less difficult there than in southern Ghana. Thus, what the GSFP demands in terms of types and quantities of food are not necessarily available at the local level. This divergence between assumptions and empirical realities is hampering the realisation of the GSFP objectives..

The research also reveals some concrete opportunities for re-orienting the social relations between farmers, suppliers, caterers or school kitchen centres and, for example, to involve MoFA, the governmental body responsible for linking farmers to improved technological practices, and/or FONG, a national umbrella organisation of farmers’ groups. Already organised farmer groups should be identified for direct supplies, without, that is, the use of middlemen. In most of the GSFP participating districts studied, farmers operate individually at micro and small scale production levels. Hence the need to organise smallholder farmers into groups. This can be achieved through collaborative efforts with strategic partners who already work with farmers’ groups and with the relevant district level divisions and agricultural extensionists.

The research on the GSFP has not limited itself to investigating the politically biased code in the institutional setting (organisation) and food procurement models, but also indicated possibilities for challenging the actual power asymmetries in the social relations of the GSFP. In this sense it represents the bridge towards a reflection on possibilities for changing the code in technology development and market accessibility.

#### **6.4 Possibilities for re-constructing social technical codes in variety development and market access**

Obviously, there is an unmet social demand on the Ghanaian cowpea market to improve the matching of cowpea cultivation and cowpea consumption. This research has revealed that there are many power asymmetries among relevant social groups concerning the cowpea variety development and accessibility to markets and that these power asymmetries close the cowpea variety development and confirm the mismatch between cowpea production and consumption. Still the research has also revealed that different opportunities exist to improve the linkages between production practices of smallholder farmers and the food consumption on local markets which may be realised by implementing specific changes in the actual cowpea breeding development and market accessibility.

It has been indicated that – despite the power asymmetries – there are social relations among social actors which have potentialities to *reconstruct* the variety development and enhance market accessibility. For example, earlier choices in cowpea breeding may be reversed and other relevant social groups involved in the design of new varieties and/or get access to domestic markets. Indeed the research has shown that it is not sufficient to carry out a *critical* analysis and makes explicit shortcomings (here, in the current organisation of formal cowpea variety development system and market accessibility), but that it is also necessary to reflect *(re)constructively* so as to identify openings.

Concerning the critical approach, the research unravels the debatable socio-cultural assumptions concerning cowpea variety preferences, reveals the power asymmetries in the social organisation of cowpea variety development and discusses the prescriptive functioning of breeding standards and procedures and the limited extent of participation of various RSGs in cowpea variety development. Regarding the GSFP, the critical approach reveals the power asymmetries in its institutional framework and in the food procurement models for school feeding. Concerning the *reconstructive* approach the research refers to opportunities for changing the earlier choices in the cowpea variety designs and to elaborate the development of more demand-driven varieties cultivated by small-holder farmers to enhance their accessibility to domestic markets. It has also been emphasised that useful input and feedback should not only be given by various groups of end-users, but that these should also be *implemented* by the technology developers. Regarding the GSFP the reconstructive part of the research refers to opportunities for opening the institutional setting and organisation of the GSFP.

In this discussion of the conclusions of the *reconstruction of the codes* in cowpea variety development and market accessibility the following four domains are identified:

1. Changing the *composition and extent of participation* of relevant social groups in the cowpea variety development and market accessibility;
2. Changing the *organisational setting* of breeding and school feeding systems;
3. *Endogenizing* the breeding and school feeding systems;
4. *Intervening in the iterative process of (cowpea) breeding and (GSFP) marketing.*

#### 6.4.1 *Changing the composition and extent of participation of RSGs in the cowpea breeding and marketing*

The empirical findings of the research reveal the politically biased participation in the institutional structuring and of some relevant social groups (RSGs) in cowpea breeding development and the conceptualization of the Ghana School Feeding Programme (GSFP). The inter-power relations among different RSGs in both domains shed light on the limitations of the actual cowpea breeding and GSFP to enhance the food sovereignty for the smallholder farmers in Ghana.

The research has revealed the prescriptive influence of the socio-cultural assumptions and choices of the technology developers in the upstream breeding phase on the downstream breeding activities of the local researchers. It also revealed the socio-cultural assumptions of a large bureaucratic apparatus which shaped the institutional framework of the GSFP. Concerning the cowpea breeding development the research has shown that upstream technology developers are particularly able to steer the social construction of (cowpea) variety development. This takes place through in-built technical specifications as breeding standards and procedures which are incorporated into the new exotic cowpea lines and disseminated for further development in the downstream breeding phase. The research concludes that the power asymmetries in the social relations of international and national cowpea breeders may be put under pressure by *expanding the breeding network* with the involvement of other RSGs who are able to challenge the social cultural assumptions that underlie the inbuilt technical specifications of the improved cowpea varieties. In order to realise this modification, it is crucial to change the composition and extent of participation of other RSGs.

The same goes for the conceptualization of the GSFP, primarily influenced by bureaucratic social groups referring to cultural assumptions about the socio-economic situation of smallholder farmers which, however, are often distanced from the real situation of smallholder farmers in the various regions of Ghana. In order to realise a reconstruction of the code in the cowpea breeding development as well as in the conceptualization of the GSFP, it is not sufficient to focus only on an expansion of the involved social groups in the conceptualization of cowpea breeding and school feeding. Additional measures about the orientation of the participation are also necessary, as discussed below.

#### 6.4.2 *The extent of participation reviewed*

The research has emphasised the relevancy of extending the collaboration between local researchers and farmers in the downstream breeding with the involvement of other relevant subgroups such as smallholder farmers oriented to household food provisioning and with consumers, processors and traders. Concerning the GSFP, the research recommends an emphasis on *extending the participation* of RSGs and thus *changing the inter-power relations* among these groups.

In this thesis the code-concept requires particular attention be paid to the presence of RSG inter-power relations and the implications of an extension of participatory groups for these inter-power relations. For example, for the cowpea breeding development it is not just a matter of only expanding the social groups in the downstream breeding phase, but it also becomes crucial to look for concrete possibilities for influencing both the upstream breeding standards and procedures and the downstream breeding choices (particularly the almost exclusive orientation on developing improved cowpea varieties for sale). In other words, the research reveals that a reorganisation of the asymmetric power relations in the cowpea breeding development requires a programme in which two strategic actions are carried out simultaneously. First, a reorganisation is necessary of the institutional setting through which neglected RSGs can become *active* participants in the various phases of cowpea breeding. Second, a reorganisation of the breeding practice is required through which these new participants become able to challenge the social cultural assumptions that underlie the in-built technical specifications and the cultivation requirements of the improved cowpea varieties.

These reflective ideas have been concretized in several ways. What might be additionally noted here is the ideal of not only expanding the groups of participatory stakeholders in breeding but also of guaranteeing that they are able to challenge those very social cultural assumptions in cowpea breeding activities that structure their social economic marginal position. Concretely, in the case of the cowpea development this means that these new participants become able to challenge and change the actual and politically biased technical functionality of the improved cowpea varieties and come up with other research priorities attuned to their location-specific contexts. In the case of the GSFP, it implies that the new involved social entities and RSGs really are able to reconceptualise the GSFP and strengthen production and consumption linkages at local level.

#### 6.4.3 *Endogenizing cowpea breeding*

The involvement of other still neglected RSGs in the institutional setting of cowpea breeding development and in the operation of the GSFP requires not only that the new participants are listened to and heard but that they are also able and allowed to (re)formulate (new) location-specific linkages between food production and consumption in Ghana. Indeed, the GSFP has been set up to realise these linkages between smallholder farmers' productions and school food consumptions. However, the research on the GSFP has also revealed that there are many

constraints in strengthening these linkages, for example using the dominant role of the caterer and supplier food procurement models instead of the school-based model.

In the case of cowpea breeding the research concludes that the presence of a global and top-down organised breeding frame work for variety developments (also observed by Pimbert 2006, McGuire 2008, Feldman & Biggs 2012) makes it difficult for new participants in the cowpea breeding network to be heard and thus able to re-formulate location-specific breeding programmes and play a role in a re-contextualizing of breeding activities. The current situation is that of a global, top-down style breeding network in which the internationally developed breeding standards and procedures prescribe the local breeding activities. For location-specific and bottom-up approaches to variety developments, not only a changed breeding network composition is needed, but also an institutional change in which local researchers are able to cooperate with various RSGs to elaborate the breeding objectives for improved cowpea varieties attuned to endogenous potentialities for local developments. But most of all there is a need to endogenize the breeding activities; to develop cowpea breeding from the priorities for development *from within* the localities.

Nowadays, the development of exotic cowpea lines (cowpea variety designs) are mostly led by breeders located at international breeding centres. In these centres, the problem definition takes place of what an improved cowpea variety should be in the Ghanaian context. Here, cowpea variety development to some extent is de-contextualized at the conceptualization stage before it is transferred back into the Ghanaian context within which it has to operate. The technology developers operating in international networks design potential solutions in the form of exotic lines for further crossing with local germplasm in the Ghanaian context. Creating such exotic lines involved a social process in which the breeder takes distance (abstracts) from the genetic materials in their natural connections (de-contextualization) and subsequently re-contextualized these materials to make them function in the Ghanaian context. However, the selected technical designs can be *technically workable or efficient but may socially not be desirable in a given context*. Some technical choices, which appear to be fair when abstracted from context-specific values at the time of design, tend to be discriminatory in actual context.

One example is the relation between improved varieties and use of agrochemicals. Results show that farmer's adoption of improved varieties often implies an over-reliance on external inputs like fertilisers and/or pesticides and insecticides (see also Quaye et al. 2009, Okorley et al. 2002, Isubikalu et al. 1999). In contrast, local varieties integrated in local crop rotation systems required less fertilisers and are more insect resistant than improved varieties, which require more fertilisers and/or pesticides and insecticides in order to get the expected yields. There is also an externalization (Van der Ploeg 1992) or the de-contextualization of seed development that denied the farmer practices in producing their own seed typical of subsistence farming systems. The de-contextualization of the seed production has also consequences for the inter-power relations among different social groups. For instance, the breeders of new seeds and the cultivation of these improved seeds by local farmers shifts the power balance towards seed suppliers and farmers in which the companies – who often

develop hybrid seeds – become the relevant actors in food production systems instead of the farmers (Nicholson 2011, Reardon and Perez 2010, Ruivenkamp 2005).

This thesis has shown that there is a mismatch between varietal choice by farmers and breeders and what consumers desire, which has contributed to the gradual crowding out of small-scale cowpea farmers from the Ghanaian domestic market. The research concludes that although some technical elements may appear to be applicable in a wide range of social contexts, there is the need to develop improved varieties from within their social-economic context and to recontextualize the breeding standards and procedures to the location-specific needs. Therefore, it is necessary that various social groups be involved in the conceptualization of the research objectives and that they play an active role in the iterative process of conceptualizing and implementing social technical codes in cowpea breeding.

#### *6.4.4 Intervening in the iterative process of cowpea breeding and marketing*

Cowpea breeding and marketing involve social relations of which many are open to intervention and reconstruction. This research reveals the relevance of changing the composition of social groups and their extent of participation in the conceptualization and operation of cowpea breeding and marketing. It has also shown that inter-power relations among these various social groups are incorporated in standards, procedures and food procurement models and that it is precisely this iterative process of societal and technological developments which illustrates that in all the phases of cowpea breeding and marketing the inter-power relations can be challenged and reconstructed.

However, over-optimism needs to be guarded against. The realisation of reconstructions are not easy and that the asymmetrical relations are not only produced, and *reproduced* in the *practices* of cowpea breeding and marketing, but also strengthened due to an *unequal accessibility and availability of resources*, such as technical know-how, research infrastructure and funds. The most empowered in terms of resource accessibility and availability take the leading roles in developing (cowpea) varieties and a lack of resources limits the extent of involvement of local researchers and end-users in the varietal development process and makes it additionally difficult to consult other non-privileged groups to participate in the breeding process. In Ghana the unequal division of resources among different groups of actors lead to inadequate human capacity (inadequate of knowledge and skills in modern breeding techniques), lack of breeding facilities (lack of specialized equipment for breeding and diagnosis) and inadequate local funding, which all together constrain the possibilities for local researchers and other stakeholders to influence the development and release of new cowpea varieties.

It is vital that local researchers who understand the context specific challenges and opportunities be empowered. This requires increased local investments in research to boost the level of commitment and participation in variety development and to enhance small-holder farmers' access to domestic market. This means that local actors need to be resourced adequately in order to actively participate and make effective contributions right from start, from the conceptualization stage through to the utilization of an improved variety. Such a

plea for reconstruction implies also the formulation of some concrete recommendations for policy measures, which follow.

## **6.5 Reflexive remarks and policy recommendations**

This research on cowpea variety (technology) development and market accessibility has been stimulated by debates on food sovereignty and has been carried out within a multidisciplinary research programme entitled Tailoring Food Science and Technology to Endogenous Patterns of Local Food Supply for Future Nutrition (TELFUN). I would like to conclude by making some reflexive remarks on the debates of food sovereignty and how these debates have stimulated this research and on the personal experience of being involved in a multidisciplinary research programme.

### *6.5.1 Enhancing food sovereignty*

This research has been stimulated by the debates on food sovereignty as raised by social movements, criticising the negative consequences of the current corporate and monopolistic control over food production and consumption systems. As an emerging concept, food sovereignty draws attention to endogenous development of food production and consumption. Several authors (Beuchelt & Virchow 2012, Carney 2011, Boyer 2010, McMichael 2009, Patel 2009, Rosset 2008, Desmarais 2008, and Quaye 2007) point out food sovereignty principles, some of which include (1) the right to adequate, safe, nutritious and culturally appropriate food; (2) the right to productive resources like land and improved varieties; (3) the right to environmentally friendly production practices; and (4) the right to access local, fair regional and international markets. The empirical research on variety (technology) and domestic market relations in Ghana through the conceptual frameworks of *relevant social groups* and *social-technical codes* has delivered insights on the constraints and opportunities for enhancing food sovereignty in Ghana.

The application of concepts such as *relevant social groups* and *technical code* draws attention to socio-cultural assumptions and differences in values and interests among various social groups incorporated in both the cowpea varietal development and the Ghana School Feeding Programme (GSFP). Possibilities for changing the composition of social groups relevant to the design of the ‘technical code’ in variety designs and GSFP and the implications of these changes for food sovereignty are highlighted here.

The research reveals that local market access by smallholder farmers is highly influenced by the ways in which agro-technological developmental efforts are organised and managed to (re-)connect to local social contexts. I argue that it is important that plant breeding programmes become fully participatory from the initial stages, involving all relevant social groups as knowledgeable agents. The future of farming is embedded in and reflected by the material design of technological artefacts such as improved varieties. Therefore in our quest to develop appropriate improved varieties for enhanced food sovereignty, some specific socio-cultural assumptions and values that have been foreclosed in ‘technical codes’ may need to be (re-)opened for reconsideration. This re-design process should be based on, among

other things, specific local socio-cultural conditions in which an improved variety will have to perform, the kind of farming system in which an improved variety has to operate and the roles and relations of RSGs. As has been illustrated in this research an appropriate variety goes beyond the technical functionality (yield, resistance to diseases and pest, and early maturing) and incorporates its social applicability (cost implications, taste and cultural value). Again the appropriateness of a variety is not only determined just by production level concerns but also by issues relating to domestic market access by smallholder farmers for sustaining livelihoods. The process of developing a new variety or re-constructing existing variety in response to unmet demand requires a reconsideration of values and experiences from end-users and a social space of manoeuvre to incorporate these values and experiences in the variety designs.

Referring to the food sovereignty concept in which the relevancy of access to attuned varieties for location-specific developments is emphasised, this research has revealed the limitations of centralized upstream breeding activities at international research centres as an institutional code. Comparing different relevant subgroups of farmers and their practices, the research has shown that groups of small-scale farmers consider the free exchange of genetic resources as a culturally based practice in which genetic resources are not regarded as sources of economic reward. Food sovereignty implies increased access and control over natural, social and productive resources. Also argued by Pimbert (2006), a radical shift from the existing top-down and increasingly corporate controlled research system towards enhanced agency for farmers, indigenous researchers, food processors and consumers is crucial for the achievement of food sovereignty.

The food sovereignty concept also criticises the crowding out of small-scale farmers from the domestic market due to influx of cheap foreign food products. Empirical findings from the GSFP analysis provides a test case of what actually happens to the food sovereignty situation of small-scale farmers who have (organised) access to a domestic market (the ‘success story’). Farmers in marginal(ized) areas, especially those in hunger hotspots, cannot just produce for the GSFP market: they and the market need to be organised in a way that reflects endogenous capacities and improves the farmers’ access to production resources.

This research also establishes a conceptual similarity between the ‘codes’ of organising GSFP and developing a socio-technical artefact such as cowpea variety. When social-cultural assumptions (the codes) in variety and GSFP designs are revealed, possibilities emerge to re-construct socially relevant improved varieties and enhance domestic market access by smallholder farmers. Results from this research suggest that the GSFP food procurement mechanism cannot be a one-size-fits-all approach, embracing all the participating communities in a single system. There ought to be room for attuning to specific endogenous farming practices and practical limitations in any given community, so as to give farmers enhanced agency and autonomy over production and marketing decisions.

In conclusion, the ‘code’ analysis of the varietal development and GSFP has clarified that variety and GSFP designs do not necessarily conform only to the interests and values of specific RSGs such as technology and programme developers but that also other socio-



cultural values can be integrated in the design processes. The research has emphasised that when varietal development is socially re-constructed, domestic market access is enhanced, and this, in turn, will promote the food sovereignty of smallholder farmers.

From the food sovereignty perspective, farmers should have access to domestic market driven improved varieties. Multi-targeted and context specific breeding programmes focusing on different kinds of production systems are required instead of the global downstream breeding framework. A breeding programme that distinguishes the context of subsistence farming systems from that of commercial farming systems will ensure a more sustainable and equitable development. For commercial farming systems, varietal selection must match domestic market preferences, but this might not be the most preferred choice for subsistence farming systems that urgently need to meet household food provision before considering what to sell.

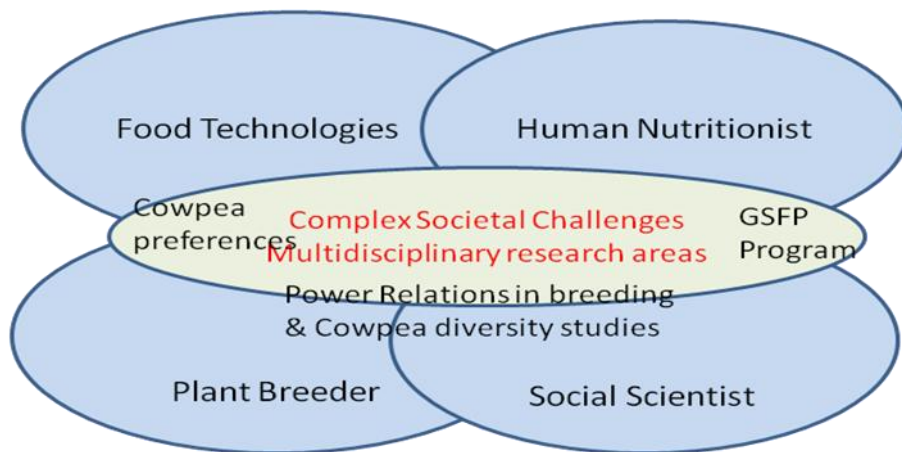
### *6.5.2 Reflections on multi-disciplinarity*

This PhD thesis forms the social science part of the Ghana/Benin team on Tailoring Food Science and Technology to Endogenous Patterns of Local Food Supply for Future Nutrition. This TELFUN project is a multidisciplinary research project which consists of plant breeders, food technologists, nutritionists and social scientists forming three main research cohorts in three regions, Ecuador, India and Ghana/Benin. Instead of developing science and technology for society, the TELFUN project proposes science and technology development *in* society (Ruivenkamp 2005), addressing local problems and challenges with local stakeholders.

The social science contribution of the TELFUN team was to ensure that technologies studied or even developed in the project (crop varieties by a breeder, food products by a food technologist) are tailored to societal needs and the aspirations of the intended users. In Ghana/Benin a coordinated network study (CNS) involving the plant breeder, food technologist, nutritionist and social scientist was conducted at the project inception stage. The objective of the CNS was to fine-tune specific disciplinary research questions and find possible multi-disciplinary collaborative research areas to avoid duplication of efforts and to enhance effectiveness of the research outputs. The CNS ensured effective interactions with stakeholders and helped researchers to acquire first hand information on the pressing societal needs. This facilitated the research fine-tuning process and ensured a bottom-up approach to the understanding of societal challenges and potential solution, thereby ensuring a more integrated approach to the solving of both scientific and social research problems. Furthermore, common research areas were identified and appropriate strategies developed for effective collaboration among team members for subsequent research activities.

Specifically, the cowpea diversity assessment work and cowpea preference studies in this thesis were conducted in collaboration with the cowpea breeder and the food technologist respectively. The breeder handled the physical characterization of cowpea samples collected from the various markets visited for diversity assessment while the food technologist provided inputs for the cowpea preference studies.

The breeder also assisted in the organisation of farmer field trips for participants' observation and interpersonal interactions on participatory breeding activities in Ghana. The nutritionist also played a key role in the GSFP Analysis, particularly in relation to site selection and the development of tools for food sovereignty proxies. Contributions of this social science research to other members of the team involved an understanding of social relations, power issues and interpretation of choices among various actors as well as enhancing food sovereignty (in the local cowpea network).



**Figure 6.1** TELFUN's Multidisciplinary team

Another strategy developed in the TELFUN project for information sharing and collaborative efforts was the organisation of *annual workshops*. The TELFUN annual workshops, which were rotated among the participating countries (Ecuador, India and Ghana) with field trips to project communities, constituted a unique and innovative development research strategy. This offered practical learning experiences at both multidisciplinary and disciplinary levels and strengthened interactions between PhD students and supervisors, especially during evaluation and feedback sessions at the field work level. The multidisciplinary research approach opened up opportunities for data sharing, team analysis and joint publications on cross-cutting themes.<sup>50</sup> This also offered team members the opportunity to influence one another's work through the cross fertilisation of ideas.

I have learnt many lessons from this multidisciplinary research, which I would like to summarize. Firstly, it is important that team members work in a *central location* for effective interactions, cost-effectiveness, the organisation of meetings and exchange of ideas both formally and informally. For a multi-disciplinary PhD research activities to be well-integrated there must be *strong collaboration between PhD supervisors as well*. Supervisors from the collaborating disciplines need to agree on possible synergies and barrier breaking areas between disciplines in order to foster stronger linkages among PhD students. This was lacking in TELFUN and therefore there was pressure on PhD students to find common areas of integration in their work by themselves, and most times creating tensions among students.

<sup>50</sup> Quaye et al. (2009b) and Quaye et al. (2011).

The experience of learning new things among peer colleagues from various disciplines, however, was *great*.

Multidisciplinary research *helps to build teamwork skills* and reveal the contributions of other disciplines. Collaboration from multidisciplinary interactions helps to orient *better disciplinary research activities* and create a *common understanding* of the local challenges. Indeed, the complex nature of real life problems and challenges require multidisciplinary research efforts, where different problem solving strategies from various disciplines will be employed concurrently.

Suggestions for improving multidisciplinary research approach include the needs i) to develop multidisciplinary research methodologies, ii) for well planned multidisciplinary research areas to avoid inefficiencies and time wasting, and iii) for more multidisciplinary journals to facilitate multidisciplinary publications.

I conclude this research on technology and market relations by recommending local strategies for enhanced food sovereignty through the development of tailor-made varieties and enhanced domestic market access by smallholder farmers.

On the technology side, cowpea breeding interventions tend to concentrate heavily on technical issues like yield, time of maturity, stress tolerance, disease resistance and acceptable seed characteristics which do not sufficiently address socially related issues such as domestic market access by smallholder farmers. I therefore recommend that the national policy on variety (technology) development should encourage the active participation of all relevant social groups (especially the different categories of farmers, traders, processors and consumers) to bring their interests and priorities to bear on all the variety development phases. I also propose institutional rearrangements that allow for and actively encourage the active participation of local researchers in upstream breeding activities conducted at international research organisations and the setting up of a multi-targeted breeding framework with clear breeding objectives taking into account the differences in varietal preferences at production and consumption levels, either for market or household consumption through extensive stakeholder engagements.

On the market access side, policy strategies for re-linking small-scale producers to their domestic market through the GSFP should focus on i) strengthening linkages with strategic partners who are already working with well-organised small-scale farmer groups for bulk food supplies; ii) strengthening the roles and responsibilities of specific groups of actors through performance contract agreements and regular monitoring, such as contract agreements with caterers specifying food purchases from local farmers; iii) sustaining national commitment and funding through the creation of a dedicated fund for the GSFP; and iv) community engagements in regular sensitization and evaluation workshops among stakeholders.

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## SUMMARY

The concepts of ‘*relevant social groups*’ and ‘*technical code*’ are used to investigate the social relations in cowpea variety development (*technology studies*) and also the relationship of small-scale farmers to the Ghana School Feeding Program (*market access*) against the background of *food sovereignty*. For the *technology studies*, empirical findings reveal the wider socio-cultural context within which cowpea production, processing and consumption are organized and the differences in social meanings constructed for cowpea varieties among *relevant social groups (RSGs)* in the local cowpea network. Farmers attach social meanings to variety choices in relation to the purpose of cultivation, either primarily for household food provision or for commercial purposes, and select varieties on the basis of these social meanings alongside other, technical considerations, such as yield and tolerance to diseases and pests. There is another, sharper contrast between social meanings ascribed to cowpea variety choice by (small-scale) processors and consumers from that of the farmers. Processor and consumer cowpea variety preferences are tied to bean characteristics, such as white seed colour, short cooking time and taste, which are more attuned to the social relevance of consumption than technical functionality for cultivation.

There are different desires for different traits and thus different varieties of cowpea among the various RSGs, yet empirical findings show that the *technical codes* in variety designs do not reflect these. In particular, the social meanings constructed for preferred cowpea varieties among the RSGS in the user (processor/consumer, as opposed to producer) category go unrecognised in the variety designs produced in Ghana. Basically, empirical findings confirm a mismatch between what farmers grow and what consumers want. There is thus a demand on the Ghanaian cowpea market that local farmers fail to take advantage of, an opportunity that has been taken instead by foreign producers. To understand why the variety preferences of some RSGs have been neglected in Ghanaian cowpea variety development, we unearth the structural and asymmetric power relations among the RSGs in constructing the technical codes of variety designs.

Research reveals three major phases in the social organisation of cowpea variety development in Ghana: the upstream breeding, downstream breeding and validation and release. A core element in the upstream breeding is the development of technical codes in variety designs or exotic lines using local germplasm as raw material at the international breeding centres. These codes have both technical specifications and in-built socio-cultural assumptions that become explicit through critical reflection on the variety development process. In the downstream breeding phase, the core element of the variety development process becomes the adaptability of the exotic lines to the local environment, basically involving evaluation of and selection from the variety designs developed upstream. At the validation and release phase, interpretative differences and design flexibility come to a closure as the National Variety Release Committee (NVRC) determines a proposed improved variety to be an improvement over already existing varieties.



There is a strong influence of international researchers in the development of exotic lines upstream, largely due to power imbalances between this and other RSGs, such as in technical know-how, research infrastructure and funding resources. This *asymmetric relationship* means that downstream breeding activities are centrally controlled through the functioning of standardized breeding procedures developed by international breeding institutions at the upstream breeding phase working with the basic intention of a universal applicability of (cowpea) variety design. This research thus points especially to the need for institutional rearrangements that encourage a greater engagement of local researchers in upstream breeding and the inclusion of other RSGs in the user category in the breeding process. And in order to enhance flexibility in attuning exotic lines developed at international organisations to locality specific contexts in downstream breeding, this study recommends the establishment of localized (rather than global) breeding frameworks, with clear (sets of) RSG defined breeding objectives that consider the differences in variety preferences at production and consumption levels, for both market and household consumption. Indeed, small-scale farmers can enhance their access to the domestic market and their food sovereignty if demand driven varieties are produced.

The *market access* study using the Ghana School Feeding Program (GSFP) typifies a food re-localisation strategy which elaborates on the relationship of market access for smallholder farmers to their food sovereignty situations. Similarly to the empirical findings from the technology studies, the *code* analysis of the market access study shows structural limitations and unequal power relations among GSFP RSGs. Despite the good intentions of decentralizing decisions pertaining to the GSFP, this research reveals a top-down bureaucratic approach to program conceptualization and implementation that has effectively negated some RSGs. The GSFP was implemented with little involvement by small-holder farmers who are supposed to represent one of the beneficiaries of the programme (by supplying the market it creates) The local (district and school) level bodies supposed to be responsible for mobilizing community support and linking smallholders to the GSFP market were not empowered to perform. They were given little support or direction as to their roles and responsibilities and there were funding shortages for food purchases. This situation gave traders and other food suppliers the power to use their money to take advantage of the market opportunities created.

The asymmetry of power influence among the RSGs in the GSFP network is reflected in the choice of food procurement model. A code analysis of the market access study shows three procurement models to be operative in the GSFP: i) the *Supplier Model*, which employs the use of contractors or suppliers to supply food items to the schools, ii) the *School-Based Model*, which involves the community mobilization of resources and purchase of raw foodstuffs from local farmers, and iii) the *Caterer Model*, which involves the handling of food purchases and food preparations by contracted qualified caterers. In practice, the caterer model is found to be mostly used largely due to convenience and power imbalances, even though it is the school-based model that best fits the programme objectives. This is shown to be a significant cause of the failure of smallholders to access the GSGP market and their 'replacement' by traders and other food suppliers.

Nevertheless, assessment of the socio-economic impact on the group of farmers (less than 30% of 100 farmers interviewed in GSFP participating communities) who have been able to access the GSFP market shows a very positive relationship between market access and household food sovereignty. In the space of a year, production of the crop sold (rice) went up 30%, food stocks rose by a half (from six to nine months) and farmers' incomes increased by 80%. Notably, these farmers were organised, by a development agency, which also provided various inputs (including credit and technical assistance) and, acting as the link to the GSFP, guaranteed the market.

Several factors are found to have limited and continue to restrict effective implementation of the GSFP, but from the code analysis it is clear that the GSFP can be socially reconstructed to seek specific goals. Despite the constraints limiting smallholder farmer access to the GSFP market, critical investigations into the procurement models open-up possibilities for reconstructing the GSFP market and making it an endogenous structure that can facilitate smallholder access. Identification also of the factors enabling access on the part of some farmers also suggests ways in which interventions in social relations can enable *localised producer-consumer linkages* through the GSFP that promote food sovereignty.

Since resource constraints favour the use of supplier and caterer procurement models, it is recommended that contract agreements specify food purchases from local farmers. Concrete proposals for endogenizing the GSFP to facilitate the linkage between local food production and school feeding (local consumption) include i) strengthening collaboration efforts with strategic partners working with farmer groups, ii) developing social relations between farmers and caterers or school kitchen centres, and iii) affirming the roles and responsibilities of actors who have the capacity to develop farmer-GSFP linkages through performance contract agreements and regular monitoring. The Ministry of Food and Agriculture and FONG, an apex organisation of farmers' groups, were identified as actors that could be developed for important, nationwide roles at the local level.

This research shows a link between *endogenous development* and *household food sovereignty*. Empirical findings from the GSFP analysis provide a test case of what actually happens to the food sovereignty situation of small-scale farmers who have good access to a domestic market. Using a range of measures at the household level as proxy for food sovereignty, this study shows a positive linkage between domestic market access for smallholder farmers and food sovereignty. However, it is realised that farmers in marginalized areas, especially those in hunger hotspots, cannot just produce for the GSFP market unless it is organised in a way that reflects endogenous capacities and improves small-scale farmers' access to production resources.

The technological studies and market access parts of this research both reveal the importance of *participation* by RSGs – the former especially through genuinely participatory plant breeding programmes and the latter through the need for communities and farmers' groups to be proactively introduced into and involved in the organisation of food procurement. Underscoring this, the linkage of fundamental failures, again in both programmes – both in breeding (at the upstream phrase) and school feeding (conceptualisation and implementation)

– to asymmetric social power relations attest to the need to confront and restructure these in practical, creative ways.

## SAMENVATTING

Het proefschrift omvat een technologiestudie en een marktstudie uitgevoerd in het kader van een interdisciplinair onderzoeksprogramma TELFUN, gericht op het doordenken van mogelijkheden voor een toenemende voedsel soevereiniteit in Ghana. Hiervoor wordt in beide deelstudies verwezen naar de concepten van “*relevante sociale groepen*” en “*technische code*”. Deze concepten worden gebruikt voor onderzoek naar de sociale relaties in de cowpea veredeling (technologie-studie) en in de toegang van deze producten tot de markt van het Ghanese voedselprogramma (markt-studie).

Voor wat betreft de technologie-studie toont het empirisch onderzoek het belang aan om veredeling te plaatsen in een breed maatschappelijke context van cowpea teelt, verwerking en consumptie. Ook toont het onderzoek het belang aan dat verschillende relevante maatschappelijke groepen (RSGs) een verschillende sociale betekenis geven en verwachtingen uiten ten aanzien van de cowpea veredeling. Zo geven verschillende groepen boeren een verschillende sociale betekenis aan het doel om cowpea te verbouwen. Daarbij plaatsen sommige boeren de veredeling in het verlengde van huishoudelijke voedselvoorziening; andere groepen boeren zien de veredeling in het verlengde van meer commerciële doeleinden en het genereren van inkomen. Behalve een verschillende betekenisgeving van groepen boeren aan het doel van de veredeling, bestaan er ook verschillen onder deze groepen boeren omtrent technische issues zoals opbrengst en tolerantie voor ziekten en plagen. Bovendien toont het onderzoek aan dat behalve een verschillende betekenisgeving onder verschillende groepen boeren er ook een scherpe contrast bestaat omtrent de sociale betekenisgeving van verwerkers en consumenten aan cowpea veredeling in vergelijking tot de betekenisgeving die verschillende groepen boeren geven. Verwerkers en consumenten hebben een voorkeur geuit voor variëteiten gekarakteriseerd door de kleur (witte zaden), korte kooktijd en smaak; Kortom: variëteiten die eerder zijn afgestemd op het maatschappelijk belang van de consumptie dan op een voorkeur van variëteiten gebaseerd op de technische functionaliteit van bepaalde variëteiten (resistentie, opbrengst) binnen de cowpea teelt.

Het empirisch onderzoek heeft kenbaar gemaakt dat verschillende relevante sociale groepen verschillende wensen hebben t.a.v. de verschillende cowpea kenmerken en voorkeur hebben voor verschillende cowpea variëteiten. De empirische bevindingen tonen echter ook aan dat deze verscheidenheid in voorkeuren niet is opgenomen in (de technische codes van) de cowpea veredeling. Vooral de voorkeur voor de sociale betekenissen die de gebruiker (verwerker en consument) toekent aan de cowpea variëteiten worden niet in de cowpea veredeling meegenomen. De veredeling richt zich daarentegen vooral op de voorkeur voor variëteiten die andere sociale groepen hebben (zoals wetenschappers en de op de markt gerichte boeren). Empirische gegevens tonen aan dat de consequentie hiervan is dat er een wanverhouding ontstaat tussen variëteiten die de boeren telen en variëteiten waar de voorkeur van consumenten naar uitgaat. Er is dus een vraag op de Ghanese cowpea markt naar bepaalde cowpea variëteiten waaraan de lokale boeren in hun cowpea teelt niet (kunnen) voldoen, terwijl dat wel gebeurt door telers in het buitenland. Om te begrijpen waarom de uiteenlopende voorkeuren van bepaalde relevante sociale groepen genegeerd worden in de ontwikkeling van cowpea variëteiten richt het onderzoek zich vervolgens op het ontrafelen van de structurele en asymmetrische machtsverhoudingen tussen de verschillende sociale groepen in het ontwerpen van verschillende variëteiten. Er is nagegaan welke technische codes in het ontwerpen van cowpea variëteiten zijn meegenomen. Hiervoor is onderzoek gedaan naar de sociale organisatie van de cowpea veredeling in Ghana en heeft het onderzoek

aangetoond dat er drie belangrijke fasen zijn in de cowpea veredeling; De upstream fase, downstream fase en de fase van testen en uitgeven van de nieuwe rassen. Een kern aspect in de upstream fase is de aanwezigheid van internationale onderzoekscentra die een belangrijke rol spelen in het ontwikkelen van nieuwe cowpea lijnen die verder door-veredeld worden in de nationale onderzoekscentra. Het zijn dan ook vooral deze internationale centra die de basale keuzes maken omtrent de doelen en voorkeuren van bepaalde lijnen en daarmee bepaalde groepen en hun voorkeuren in de veredeling in- of uitsluiten. Deze incorporatie van voorkeuren van bepaalde sociale groepen in de veredeling vindt plaats via het gebruiken van specifiek lokaal genetisch materiaal als grondstof voor het verder ontwikkelen van nieuwe variëteiten. Het in- of uitsluiten van de voorkeuren van bepaalde sociale groepen leidt tot een specifieke technische code in de cowpea veredeling met specifieke technische specificaties die aansluiten op de voorkeuren van bepaalde sociale groepen. Hierdoor worden ook specifieke sociaal-culturele vooronderstellingen omtrent de voorkeuren van specifieke variëteit kenmerken in de veredeling van de nieuwe variëteiten opgenomen. Deze technische specificaties en sociaal-culturele assumpties worden in dit onderzoek via een kritische reflectie op de veredelingspraktijk geëxpliciteerd. Zo toont het onderzoek aan dat in de downstream fase van de veredeling het aanpassen van de – in de upstream fase ontwikkelde - lijnen aan de lokale omgeving een cruciaal kenmerk van de downstream veredeling wordt. Dit impliceert dat in de downstream fase vooral een evaluatie en selectie van variëteiten plaatsvindt die vanuit de assumpties in de upstream ontwikkeld zijn. De incorporatie van de sociaal-culturele assumpties krijgt een extra dimensie in de fase van “het testen en uitgeven van de nieuwe variëteiten”. In deze fase vindt een afsluiting (closure) plaats van de interpretatieve verschillen en ontwerp flexibiliteit wanneer de nationale (NVRC) commissie de voorgestelde verbeterde variëteiten erkent als een verbetering ten opzichte van reeds bestaande rassen.

Deze sterke invloed van onderzoekers in de internationale centra op de ontwikkeling van nieuwe cowpea lijnen (oftewel uitgangsmateriaal voor verdere veredeling) komt grotendeels voort uit de onevenwichtige machtsverhoudingen tussen deze onderzoekers en andere relevante sociale groepen omtrent het bezit en toegang tot technische know-how, infrastructuur voor onderzoek en financiering van onderzoek. Deze asymmetrische verhouding impliceert dat de veredeling in de daaropvolgende downstream fase – vaak uitgevoerd door nationale onderzoeksinstituten – gecontroleerd wordt door het functioneren (en opleggen) van gestandaardiseerde veredeling procedures die ontwikkeld zijn binnen de internationale veredeling instellingen in de upstream fase. Procedures die veelal werken vanuit het principe van een universele toepasbaarheid van een specifieke methodiek voor het ontwerpen van nieuwe variëteiten. Dit onderzoek wijst dus vooral op de noodzaak van institutionele veranderingen (herschikkingen) die een groter betrokkenheid van lokale onderzoekers in de upstream fase impliceren en het mogelijk maken dat voorkeuren van andere relevante sociale groepen uit de gebruikers categorie in het veredelingstraject worden meegenomen. De studie beveelt aan de flexibiliteit in het aanpassen van de cowpea lijnen - als uitgangsmateriaal voor veredeling, ontwikkeld binnen internationale centra – aan lokaal-specifieke omstandigheden te versterken. Derhalve wijst het onderzoek op het belang lokale (in plaats van globale) netwerken van veredeling op te zetten waarin duidelijke veredelingsdoelen worden geformuleerd die gedragen worden door verschillende belangrijke lokale sociale groepen. Lokale veredelingsnetwerken waarbinnen ook ruimte wordt gegeven voor de verschillende voorkeuren voor verschillende cowpea variëteiten op productie en consumptie niveau alsook voor variëteiten die gericht zijn op of het genereren van inkomen via een verkoop op de markt of op huishoudelijke voedselvoorziening. Immers, kleine boeren kunnen hun toegang tot thuismarkt en hun voedselsoevereiniteit vergroten indien zij in staat

zijn om vraag-gestuurde variëteiten te telen die echter gericht kan zijn op “verschillende markten”.

De marktstudie uitgevoerd via een onderzoek naar “Ghana School Feeding Program” (GSFP) richt zich op de sociale relaties die de (on)toegankelijkheid tot GSFP markt voor kleinschalige telers bepalen alsook op de mogelijkheid een strategie van relokalisatie van voedselproductie te implementeren. Zoals bij de technologie-studie toont ook de marktstudie aan dat er sprake is van een specifieke code in de sociale relaties die de toegankelijkheid tot de GSFP markt bepaalt en zich kenmerkt door de aanwezigheid van ongelijke machtsverhoudingen onder verschillende belangrijke sociale groepen. Ondanks de goede bedoelingen om besluitvorming omtrent het GSFP recentelijk te decentraliseren toont dit onderzoek aan dat er toch sprake is van een sterk top-down en bureaucratische benadering in de conceptualisering en implementatie van het programma waarbij bepaalde relevante sociale groepen worden genegeerd. Zo werd het GSFP geïmplementeerd met een geringe betrokkenheid van kleine boeren waarvan echter verondersteld werd dat zij juist een van de begunstigden van het programma zouden zijn (via een bevoorrading van GSFP markt met hun producten). Ook werd verondersteld dat lokale instanties op school en district niveau verantwoordelijk zouden zijn voor het mobiliseren van steun op het niveau van de lokale gemeenschap en voor het koppelen van groepen kleine boeren aan de GSFP-markt, terwijl deze instanties uiteindelijk niet bevoegd waren deze taken uit te voeren. Juist deze instanties kregen weinig steun of richting voor het uitvoeren van hun rol en verantwoordelijkheden. Bovendien hadden zij te kampen met financieringstekorten voor het aankopen van voedsel. Deze situatie gaf vervolgens handelaren en andere voedselleveranciers de mogelijkheid om voordeel te behalen om met hun geld (hun economisch macht) te profiteren van nieuw gecreëerde kansen op de GSFP markt.

De asymmetrische invloed van verschillende belangrijke sociale groepen in het GSFP-netwerk wordt weerspiegeld in de keuze van de voedsel inkoop modellen. De markt studie toont aan dat in het GSFP drie modellen worden gebruikt om de voedselproducten aan te schaffen: (i) het *leveranciersmodel*, waarbij aannemers en/of leveranciers worden gebruikt om de voedingsmiddelen aan scholen te leveren; (ii) het *op school-gebaseerde model*, waarbij de aankoop van agrarische producten van lokale boeren plaatsvindt via een mobilisatie van de lokale gemeenschap zelf; (iii) het *catering model* waarbij voedsel aankopen en de bereiding van dat voedsel voor consumptie in scholen plaatsvindt via gekwalificeerde cateraars. In de praktijk blijkt dat aan “het catering model” de voorkeur wordt gegeven, wat grotendeels te wijten is aan het gemak en onevenwichtige machtsverhoudingen tussen de verschillende groepen terwijl het school-gebaseerde model juist het best past bij de doelstellingen van het programma. Het negeren van het “op school gebaseerde model” voor aanschaf van voedsel blijkt een belangrijke oorzaak te zijn voor het mislukken van het programma om kleine boeren toegang te geven tot het GSFP markt terwijl zij vervangen worden door handelaren en andere voedsel leveranciers. Ondanks de hierboven beschreven beperkingen toont de bestudering van de sociaaleconomische impact van het GSFP op die groepen boeren die in staat zijn toegang te krijgen tot de GSFP markt (het betreft weliswaar minder dan 30% van de 100 boeren, geïnterviewd in GSFP deelnemende gemeenschappen) dat voor hen sprake is van een zeer positieve relatie tussen het krijgen tot toegang tot de GSFP markt en hun huishoudelijke voedselsoevereiniteit. Zo steeg in tijdsbestek van een (1) jaar de verkoop van de door hen geteelde rijst met 30%, nam de voedselvoorraden toe met de helft (van zes tot negen maanden) en steeg het inkomen van de boeren met 80%. Hierbij moet wel worden opgemerkt dat dit groepen boeren betrof die georganiseerd waren door een ontwikkelingsinstantie, die hen verschillende inputs leverden (met inbegrip van krediet- en

technische bijstand) en, die ook als een verbindingsschakel functioneerde naar het GSFP en een markt afzet garandeerde. Het onderzoek heeft verschillende factoren gevonden die een effectieve uitvoering van de GSFP beperken. De analyse van de asymmetrische sociale relaties - gecodeerd in de beperkte toegang tot de GSFP markt - heeft echter ook duidelijk gemaakt dat het GSFP maatschappelijk gereconstrueerd kan worden en dat specifieke doelen kunnen worden nagestreefd. Zo verduidelijkt het onderzoek naar de verschillende modellen om voedsel lokaal aan te schaffen dat er toch mogelijkheden zijn om – ondanks de huidige beperkte toegang tot de GSFP markt voor kleine boeren – de GSFP markt te her-openen en een toegang tot die markt voor kleine boeren tot stand te brengen. Ook zijn factoren geïdentificeerd die ertoe kunnen bijdragen dat sommige groepen boeren in staat zijn te interveniëren in sociale relaties tussen producenten en consumenten op lokaal niveau en een bijdrage te leveren aan een grotere voedselsoevereiniteit. Daar de beperkte middelen van het GSFP het inkopen van voedsel door leveranciers en cateraars stimuleert (ten nadele van het op school gebaseerde inkoop model) beveelt dit onderzoek aan dat er contractuele overeenkomsten worden afgesloten waarin de aanschaf van voedsel van lokale boeren gespecificeerd wordt. Kortom: het onderzoek stelt voor om het GSFP beter lokaal in te bedden (te endogeniseren) door de sociale relatie tussen lokale voedselproductie en voedselconsumptie op scholen te verbeteren door: (i) Inspanningen te ondersteunen van die strategische partners die al met lokale boeren/producenten samenwerken; (ii) De sociale relaties tussen boeren, cateraars of schoolkeuken centra te ontwikkelen; (iii) Activiteiten en verantwoordelijkheden van actoren die de capaciteiten hebben om de sociale relaties tussen lokale boeren en het GSFP te ondersteunen via het vastleggen van contractuele samenwerkingsafspraken en het regelmatig monitoren van deze activiteiten. Het Ministerie van Voedselvoorziening en Landbouw en FONG, een organisatie van boerengroepen, zijn geïdentificeerd als actoren die op nationaal niveau een rol kunnen spelen om deze activiteiten op lokaal niveau in samenwerking met strategische partners te realiseren. Dit onderzoek toont een koppeling aan tussen endogene ontwikkeling en huishoudelijke voedselsoevereiniteit. Empirische resultaten uit de analyse van de GSFP bieden een testcase voor wat er daadwerkelijk gebeurt om de voedselsituatie van de kleinschalige landbouwers te verbeteren die goede toegang tot een binnenlandse markt hebben. Deze studie toont een positief verband aan tussen binnenlandse markttoegang voor kleine boeren en voedselsoevereiniteit. Het onderzoek toont echter ook aan dat kleine boeren die leven in gemarginaliseerde gebieden en met name in de “hunger hotspots” niet voor de GSFP markt kunnen produceren, tenzij het georganiseerd wordt op een manier die de endogene capaciteiten weerspiegelt en de toegang tot de productieve bronnen en tot de binnenlandse markt voor de kleine boeren verbetert.

De technologie- en markt studie illustreren beiden het belang van *participatie* van relevante sociale groepen (RSG's). In de technologie studie met name via een participatief programma van gewasveredeling. In de markt studie door een pro-actieve betrokkenheid van lokale gemeenschappen en groepen boeren in de organisatie van de voedsel inkoop in het GSFP. De fundamentele tekortkomingen in beide programma's – in de gewasveredeling via de dominantie van internationale onderzoekcentra en via een bureaucratische conceptualisering en implementatie van GSFP met een dominantie van het cateraar en leverancier model in de aankoop van voedsel - tonen de noodzaak aan om de asymmetrisch machtsverhoudingen te herstructureren door op praktische en creatieve wijze andere sociale relaties op te zetten ter versterking van de voedselsoevereiniteit in Ghana.

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## About the Author



Wilhelmina Quaye, born on 15<sup>th</sup> July 1969, obtained her BSc (1993) and MPhil (2002) in Agricultural Economics, University of Ghana. She also took a certificate course in Monitoring and Evaluation of Development Projects at Ghana Institute of Public Administration (GIMPA) in 2003, had practical experience with EnterpriseWorks-Ghana (2003) and TechnoServe-Ghana (2006) as Monitoring and Evaluation Officer. In 2007, she joined the Critical Technology Construction (CTC) Department of Wageningen University and Research School - Social Science Group - as a Sandwich PhD student under the supervision of Guido Ruivenkamp (Promoter), Joost Jongerden (Daily Supervisor), Goerge Essebey (local supervisor) and Godfred Frempong (local Supervisor). Currently, Wilhelmina works at Food Research Institute of the Council for Scientific and Industrial Research in Ghana. She is a Senior Research Scientist and The Head of the Food Nutrition and Socio-economics Division. Her field of interest includes technology studies, socio-economics research and monitoring and evaluation of development related projects. Wilhelmina is married to David Sowah Quaye with 1 child (Gift Quaye).

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Name of the activity	Department/Institute	Year	ECTS*
<b>A) Project related competences</b>			
Qualitative Data Collection and Analysis	Mansholt/WUR	2008	2.3
Information literacy (16 hours)	WUR	2007	0.5
Methodology Clinic B (360 hours)	UVA	2008	2.5
<b>B) General research related competences</b>			
CERES orientation programme	CERES, Utrecht	2007	5.0
CERES presentation tutorials	CERES, Utrecht	2007	5.5
Advanced Social Theory	WUR	2009	6.0
<b>C) Career related competences/personal development</b>			
Presentation Tutorials	WUR/TELFUN	2008	2.3
Scientific writing Techniques	WUR	2009	1.2
<b>Presentations at Conferences</b>			
Enhancing Food Sovereignty for better future Nutrition in Ghana: A case study of the local cowpea food network. TELFUN Workshop	Wageningen, Netherlands	2007	2.0
Reconstruction of (bio)technologies and genomics in the context of food sovereignty. Genomics and Society; Setting the Agenda.	Amsterdam	2008	1.0
What Went Wrong With Food Security Policies? Consider Food Sovereignty A Better Alternative To Achieving Sustainable Development. 2 <sup>nd</sup> Development Dialogue held.	The Hague, Netherlands	2008	1.0
Tailoring Food Science and Technology to endogenous patterns of food supply -A case study in Northern Ghana. 7 <sup>th</sup> International Science Conference on the Human Dimensions of Global Environmental Change.	26-30 April 2009, Bonn, Germany	2009	2.0
Poster Presentation presentation on what went wrong with Food security Policies? Consider Food Sovereignty a Better Alternative to Achieving Sustainable Development.at the World Social Science Forum	Bergen, Norway	2009	2.0
Poster Presentation on Small-holder farmers' access to local Market-The case of Ghana School Feeding Program. NVAS African Study Day	The Hague	2009	1.0
<b>Total</b>			<b>34.3</b>

\*One ECTS on average is equivalent to 28 hours of course work