

## **THE PANORAMIC TABLE: A CONTRIBUTION TO STRATEGIC AND PROSPECTIVE ANALYSIS OF A PLANT BREEDING SITUATION**

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### SUMMARY

Once in a while, every plant breeding project has to face a difficult situation: for example, objectives not reached, insufficient production of new genetic material, poor variety adoption and context change. In most cases, the problems are biological in nature, but they may also arise from poor situation analysis leading to inappropriate selection criteria or failing seed systems. We believe that plant breeders need special tools for analysing the human situations in which they are immersed. Such tools would assist them in identifying strategies which are favourable for one, several or all of the actors in a situation. Comprehensive sociology proposes a method derived from actionist analysis. This method relies on a situation description organized in a Panoramic or Pan Table (PT) and on empathetic induction by the breeder of the actors' positions. The PT facilitates the identification of the zones of potential conflict. This paper is methodological. We show how to use the PT method in a real situation for tactical or strategic purposes. In our example, the breeder has to elaborate a specification for a cotton breeding project in the case of a commodity chain that is co-ordinated by a national cotton company. After describing the PT method and its use, we discuss its limitations and the way human problems can be taken into account when elaborating strategies for action.

### INTRODUCTION

The human sciences that deal with the subjectivist paradigm (Weber, 1965) suggest that every situation necessarily bears its own 'problematic', i.e. a set of questions people have to solve through their activities (Sartre, 1994). In general, this problematic is not made of problems, nodes and difficulties. It may be solved with natural, obvious and unconscious rituals. However, when the situation involves important stakes and complex issues, a formalized analysis may facilitate the identification of favourable strategies, as has been suggested by project agencies (ODA, 1995).

In plant breeding, risks of not reaching goals include defective genetic material or a low rate of adoption among the target users. The difficulties may be of a biological or technical nature, but they often arise also from inadequate criteria or wrong diffusion strategies. Breeders may not clearly understand the situation in which they must prove themselves. Stakeholders' (SHs) demands, positions and behaviours are a central part of the analysis of such situations. Stakeholder analysis (SA) can help to identify the

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conflicts of interests, to overcome the difficulties and in the elaboration of appropriate breeding strategies.

Different ways of practising SA have been described (Farnworth and Jiggins, 2003; ODA, 1995; Ramirez, 1999; Yung *et al.*, 1992). In this paper, we propose a modelling technique, called a panoramic table (PT), adapted from SA and also from actionist analysis, initially designed for analysing organizational behaviour. It aims at understanding actors' behaviours (activities and games) in a global situation and at strategies that are beneficial to the interests of a group of these actors. The PT should also help breeders who wish to develop participatory plant breeding projects, to distinguish more clearly among the actors, the roles played by experts and decision makers, and also to identify which SHs to involve as decision makers. We consider the case of a cotton research programme which could face difficulties in maintaining a plant breeding project in the near future. The analysis was based on what we know of Cameroon's present and also foreseeable situation in the light of three scenarios. We favour the breeder's angle, as holding a favourable position for observing and understanding the actors affected by the situation.

#### THE PAN TABLE METHOD

##### *Aim*

The PT method aims at simplifying the description and analysis of a situation; it helps to identify possible conflicts and difficulties arising among the actors themselves, in addition to possible technical or biological problems. More generally, it contributes to the understanding of the stakeholders' tactical or strategic behaviours and to action modelling for improving the efficiency of an intervention (Le Moigne, 1990).

This method can be used for analysing an existing problematic situation and for proposing tactical changes capable of solving the immediate problems or the ones likely to occur in a predictable future. When organizational changes predict that the balance of power between stakeholders, and their roles, will be affected, it can also facilitate the identification of a strategy that gives the interventions a better chance of succeeding.

##### *Origin of the method*

The 'actionist table' method is based upon 'comprehensive sociology' (Crozier and Friedberg, 1977; Schutz, 1987; Weber, 1965). It is related to the English school of organizational research. Silverman (1973), a member of this school, sees an organization as a system, in more or less stable equilibrium, in which the stakeholders negotiate permanently to define the situation and their own roles. This theory acknowledges the 'interpretative sociology' which leads from Weber (1965) or Dilthey (1942; 1947) through the 'interactionist symbolism' of Thomas (1923) or Mead (1934), up to Crozier and Friedberg (1977). For them, subjective reality can be understood through the stakeholders' search for more power or improved position in alliance networks.

Silverman (1973) introduced the ‘actionist table’ (AT) as a tool to describe and understand, at a given time, the state of the negotiation among stakeholders and to elaborate a common point of view shared by the members of an organization. It depends on formalized description and empathetic induction. Mucchielli (2005) proposed that the validity domain of the method be extended: the AT then becomes a ‘panoramic table’ (PT) that describes any collective situation, specifies the relevant stakeholders and identifies items related to their rationality.

#### *Drawing the panoramic table*

*Line headings: framing a situation to identify the relevant SHs.* Framing serves to demarcate the situation we want to study from its general environment and to determine the actors to be included in the PT. Framing is derived from systemic analysis (Watzlawick *et al.*, 1972) and provides a pragmatic modelling of the real situation in view of solving a specific problem; it is relevant only if it implicitly includes ways to address that problem.

The SHs are only considered in the PT if they are able to interact with the system through their particular stakes and resources. Classical SA distinguishes several categories of SH (e.g. ODA, 1995). Following Farnworth and Jiggins (2003), they can be simultaneously primary, key or intermediate SH, i.e. clients, owners or actors. They may be individuals, groups, organizations or institutions with a physical, social, psychological or mental existence. A SH should be able to modify the others’ activities.

Stakeholders may be composed of groups with heterogeneous and divergent interests. Such groups have to be considered in the PT, only if they control their own resources and means to act in the situation. This is not the general case.

The initial framing is realized with the ‘beneficiaries’ of the analysis. It starts as a rather open exercise, and during the analysis the PT is gradually modified and centred on the most influential SH. In a second round, it is advisable to validate or to modify the initial SH diagnosis with local actors (Ravnborg and Westermann, 2002).

*Column headings: describing the SHs’ strategies.* In order to describe the SHs’ behaviour, the PT lists a number of basic descriptors (stakes, norms, positioning and relationships between actors). The analyst remains free to modify the list as long as descriptors improve the actor’s view of the situation. Such descriptors may be material, behavioural or ideal components of the situation, that the SH believes to be important. Some may be important for one SH and negligible for others. Stakes, goals, resources, regarded as key points to negotiate are ‘cognitive objects’, that constitute a situation of distributed cognition (Descombes, 1995), on which a SH’s rationality relies.

- *Stakes* can be accessed through the SHs’ speech, behaviour and actions in the situation. They give coherence to these and delimit several ‘situational frameworks’ for each actor. Such frameworks fit into each other as an overlapping set, from the general (those of a life), to the particular (those of the immediate situation), and pass through intermediary stakes such as professional ones. Each SH decides which stake is major for himself at a given time. He may, of course, skip from one stake to the other at any time (Schutz, 1987). The stakes favoured by an actor in the

situation shed light on the global situation and help to identify the relevant items or cognitive objects for the actor.

- *Objectives* contribute to the actors' stakes in the form of concrete and measurable goals that the SHs consider to be the results of their activities.
- *Action logic*: each SH acts according to the rationality that usually inspires his conduct and typical activities. The logic includes the stakes, the objectives, the values and the norms adopted by this actor in a situation. The SH's logic is part of his strategy in the situation.
- *Negotiable components*: for these items, the actors' points of view vary according to their particular stakes, resources and position in the production system. Negotiation must help the points of view and interests to converge prior to undertaking a common action.

In order to draw the initial table and to elaborate its content, the breeder has to make an empathetic dive into the subjectivity of the concerned SH, possibly through a preliminary appraisal. From the initial elements, only the elements necessary to organize the situation will remain: those which may raise conflictual interests among stakeholders. The PT is gradually and iteratively elaborated by confronting observation with analysis. The final list of descriptors (heads of columns) can be closed only when the breeder has a clear picture of each actor's view on the situation.

### *Interpreting the PT*

The reader finds in the final PT an organized representation of the situation. Although simplified, this representation is more complete than the one any individual actor could acquire on his own. The PT can be read either horizontally or vertically:

- Horizontal reading gives access to each actor's logic and rationality.
- Vertical reading facilitates the identification of differing points of view, interests and actors' commitment.

When a situation changes, the PT must identify the new actors, or modifications to the existing actors' stakes and resources.

## THE ANALYSIS OF A PLANT BREEDING SITUATION

A plant breeding project aims at creating genetic material adapted to the potential users' needs and that is adopted by such users. By understanding the context of action, the breeder should be able to put in place strategic alliances favourable to the elaboration and to the management of such a project. He may also readjust his action in favour of a particular actor that would not receive attention in the present situation.

### *A specification for each breeding situation*

The specification set stands as a central component of a breeding project. It includes the elements necessary for the breeder to manage the breeding project and for the SH to evaluate his results, i.e. objective, expected products, breeding and evaluation

Table 1. An example of specification for a cotton breeding project.

Breeding objective	Negotiable elements		Partners commitments
	Evaluation criteria	Breeding criteria	
To breed a variety for late planting in the crop management systems of far north of Cameroon (shortage of land, animals and labour)	%F > control	Yield	Breeder
	Yield > control	Harvest facility	
	Length > 28 mm	Resistance to diseases	
	Bacterial blight resistance	%F	Cotton company
		Earliness	
	Fast initial growth	Running costs	
	Germination	Experimental fields	
		Field experimentation agents	

%F: percentage of fibre.

criteria, and committed resources (Table 1). When done formally, it provides a sound reference for each partner included in a common project.

Once validated by all SHs, the specification set is used as a starting point for the breeder to elaborate his working strategy (methods, designs, starting genetic material, expected type of variety) which will maximize the chances of success.

#### *A brief description of cotton breeding in Cameroon*

The cotton breeding programme was described as in 2000, when the breeder wanted to formalize a new specification set. A team of breeders was based at the agronomic research institute of Cameroon (IRAD). For convenience, we considered that all the members of this team shared a homogenous point of view, even though they came from different institutions, IRAD and CIRAD. The breeders worked in close collaboration with the cotton company, SODECOTON, which used to support financially key research activities in the field of plant breeding, plant protection and general agronomy. At SODECOTON, the breeders had a privileged relationship with the agricultural production director (APD) who supervised all kinds of production support services to the farmers, including extension, inputs and seed supply. The local textile industry absorbed less than 10% of the total production, the remainder was exported to the international market.

The APD selected the varieties to be grown by the farmers. These varieties were identified by the breeders among a number of lines derived from two breeding projects, whose aims were to produce (i) a long fibre variety best suited to the far north of Cameroon; and (ii) a productive and widely adapted variety for the other cotton growing areas, with a high ginning percentage and a medium fibre length.

The complete breeding design was described by Méritan *et al.* (1993). It was based in two breeding stations located at Maroua, in the far north province, and Garoua, in the northern province, and a multi-location experiment network (Lançon *et al.*, 1989) for evaluating the breeders' lines under various levels of environmental control at research stations, demonstration fields or in farmers fields.

*The analysis of the initial situation*

*The Panoramic Table.* We first drew a preliminary PT which included everyone possibly concerned with cotton improvement as a key or intermediate SH, or as a beneficiary:

- The State was a key SH: it employed the national scientists, contracted the foreign development or research aid agencies, and instructed the cotton company to co-ordinate the commodity chain in a sustainable way and in the public interest.
- The foreign development agencies were also key SHs, as they could provide (or not) the resources to set up the breeding projects.
- The local textile industry was a beneficiary, as dependent on the fibre quality produced locally.
- The cotton company could play simultaneously the roles of key, beneficiary or intermediate SH as it realized or co-ordinated many activities related to cotton production, transport, commercialisation, processing or export.
- The farmers were beneficiaries, growing the cotton varieties bred by researchers.
- Finally, the breeders were actors in the system, producing the varieties needed by the commodity chain.

A vertical reading of the PT reveals the SHs had differing interests on at least one of the specification elements, be it technical (selection criteria or type of variety) or economic (resources and commitment).

Although potential key SHs, aid agencies and the State were excluded because they had no particular stake to promote in the situation, they could exert pressure thanks to their economic and political resources, but they actually contributed little to the breeding projects' activities.

The local spinner was not ready to become a key SH. Confronted with a highly competitive international market, it looked for survival and concentrated essentially on getting favourable seed cotton prices from the cotton company, no matter the quality. The individual growers could justify a demand for a particular variety, but they had no individual or collective resources to influence the situation. It was admitted that the cotton company was in charge of their particular interests. As a consequence, only two SHs remained in the PT: the cotton company representing the key and beneficiary SHs and the cotton breeders as one actor (Table 2).

The cotton company held both economic and political resources. It paid taxes to the State, contracted with Research (see below) and purchased cotton from the growers. Moreover, its role was recognized by numerous institutional actors, either deciders or referees in the specifications set negotiation process (State or backers).

The cotton company played at least five roles, each reflecting a different point of view and the potentially divergent interests regarding the specification set: (i) it organized and supplied inputs to the growers; (ii) it co-ordinated seed multiplication and distribution; (iii) it provided a technical service to the growers; (iv) it purchased, ginned and mainly exported the national cotton production; and finally, (v) it crushed the seed to extract an edible oil and to sell it on the local market.

Table 2. Pan table completed for the initial breeding situation.

Stakeholders	Stakes	Objectives	Negotiation position <sup>†</sup>			
			Ranked breeding and evaluation criteria	Variety number and genetic structure	Commitments	Logic <sup>†</sup>
Cotton company (SODECOTON)	<ul style="list-style-type: none"> <li>To contribute to the sector's competitiveness through increasing production and improving its quality</li> <li>To facilitate the diffusion of production modes and technologies to increase the competitiveness of each actor of the sector</li> </ul>	<ul style="list-style-type: none"> <li>To improve the volume of production and the average yield</li> <li>To supply the farmers with sufficient quantity of high quality inputs at the critical times</li> <li>To reduce fibre production costs before shipping</li> </ul>	<ul style="list-style-type: none"> <li>Ginning out-turn</li> <li>Average seed cotton yield</li> <li>Agronomic performances (in adverse conditions, under high infestation, response to fertilizers)</li> <li>Seed size</li> <li>Harvest quality (cleanliness, colour, length, maturity)</li> <li>Humidity and free fatty acids in the seed</li> <li>Germination</li> </ul>	<ul style="list-style-type: none"> <li>Limited number of varieties and easy to reproduce</li> <li>One per market type (when spin mill demand is heterogeneous)</li> </ul>	<ul style="list-style-type: none"> <li>Keen to finance the improvement of ginning out-turn, fibre quality, disease or insect resistance, response to inputs</li> </ul>	<ul style="list-style-type: none"> <li>To secure the company's ginneries supply in sufficient quantity, quality and homogeneity and at a favourable price</li> <li>To give priority to genetic progress as relatively cheap to obtain and simple to spread</li> <li>To simplify and rationalize the organization of seed production in order to reduce fabrication costs and facilitate quality control (purity and germination)</li> </ul>
Research (cotton) Director	<ul style="list-style-type: none"> <li>To contribute to the sector's competitiveness through multi disciplinary research</li> </ul>	<ul style="list-style-type: none"> <li>To get funding for cotton research by demonstrating its profitable achievements</li> </ul>	<ul style="list-style-type: none"> <li>Criteria must be cropping system dependent and fixed in co-ordination with several disciplines</li> </ul>	<ul style="list-style-type: none"> <li>Favourable to diversity if this leads to an increased demand</li> </ul>	<ul style="list-style-type: none"> <li>Not ready to raise breeding budget without extra external funding</li> </ul>	<ul style="list-style-type: none"> <li>To stimulate the demand and increase the resources</li> <li>To remind the breeders collective constraints: interdisciplinarity and financial solidarity (the variety is one of many components of the crop management system)</li> </ul>
Breeders	<ul style="list-style-type: none"> <li>To contribute to the sector's competitiveness through genetic improvement</li> </ul>	<ul style="list-style-type: none"> <li>To produce outstanding varieties taken over by the actors</li> </ul>	<ul style="list-style-type: none"> <li>Ginning out-turn</li> <li>Fibre quality</li> <li>Average seed cotton yield</li> <li>Agronomic performance</li> </ul>	<ul style="list-style-type: none"> <li>The tools and methods to organize the diversity of genetic material have to be adjusted</li> </ul>	<ul style="list-style-type: none"> <li>Diversifying the varieties needs extra means</li> </ul>	<ul style="list-style-type: none"> <li>To get necessary recognition and funding to explore all technical possibilities: varieties suited to risky situations and designed for local and specific constraints are more costly to produce or to manage</li> <li>To inform the actors about the limitations</li> </ul>

<sup>†</sup> The actor's rationality is described from the relevant and negotiable elements of specification as compared with breeding and the seed system. The actor's position must be coherent with his rationality and taking into account the main elements.

The cotton company was made up of heterogeneous entities whose managers tried to promote their units' point of view. For instance, the ginning manager was particularly aware of the quality traits required by spinners or seed crushers. By contrast, the APD was more informed of the production constraints reported by the extension services, by the research agronomists or by the farmers. Managers' priorities differed. Being part of the same organization, they did not have autonomous resources to directly influence the content of the specification set. Their differences were managed internally and the resulting official point of view was sent to the APD.

On the other hand, the breeders were also part of the national research institute (NRI), a wider group of scientists paid by the State. We call it 'Research'. Within this group, we distinguish the breeders and the Research director. The breeders were mainly committed to the success of their breeding project while the Research director had to take into account the interests of Research as a whole, and those of the State. Their relative positions were expressed in the way the breeding research funds were allocated.

*Situation analysis: a private conversation, justified but not sustainable*

The State and the backers recognized only two actors as legitimate in taking care of the sector's common interest: the cotton company on one hand and the NRI on the other. The State asked the NRI to support the cotton company in its mandate to organize the sector in a sustainable way.

The State's designation of only two legitimate actors created a system which, from a tactical point of view, was quite coherent. In favouring the APD, the breeders obtained a specification that aggregated the diversity of stakes and goals of the cotton company's many activities. The system made decisions easy and it avoided a lot of transaction costs. Its efficiency relied heavily upon the ability of a single actor and character to represent all the others' particular and general interests. In order to prevent the risks associated with such a reduced specification, the breeders, however, would benefit from collecting wide and formal information from the other actors, in order to cross-check the APD's point of view.

The list of selection and evaluation criteria adopted by the breeders (Table 2) provides a picture of the situation. These criteria reflect a compromise between the APD's preferences and genetic constraints. As a consequence, breeders put more effort into improving the highly heritable traits (ginning out-turn or fibre quality) because this strategy was likely to be more successful and more rewarded. On the other hand, farmers' agronomic criteria were neither forgotten nor over-weighted.

#### USE OF THE PT METHOD IN PROSPECTIVE SITUATIONS

Would it be possible to let the decision process remain confined to the cotton company's APD and the breeders? Possibly, as long as the commodity chain actors, the State and the backers consider the situation as normal and compatible with the common interest. The fact that the number of cotton growers has increased over the recent years tends to support this idea. However, one might argue that, in difficult agricultural areas,



farmers have no other choice than to grow cotton, to sell their crop to the cotton company and to get their varieties from the existing research institutions.

We could use the information collected in the initial analysis and incorporate it into three likely scenarios:

- The producers set up a collective organization that strengthens their position in the sector.
- The cotton company is privatized and new actors emerge.
- The seed production market is liberalized and attracts private interests.

Each scenario leads to changes in the balances of power, organizational hierarchies and actors' rationality. Each produces a new PT because the framing has to be adjusted to include the relevant SH in the new situation.

Our analysis aims at reinforcing the breeders' position in the situation. At the economic level, this goes together with increasing their capacity to create an overarching value which can be distributed along the whole commodity chain. At the political level, the breeders must reinforce their legitimacy through partnerships with other actors. We will always put the emphasis on positive strategies, respectful of most users' interests and aiming to increase the breeders' credit with the other actors. Alternative strategies based upon the defence of dominant positions, to the detriment of the other actors' interest, have not been considered as they are generally not sustainable.

#### *First scenario: farmers' empowerment*

*The farmers and their organizations in the PT.* The farmers' collective organization has been recognized institutionally by the donors, the industry's backers and the State. As SHs, they get access to political as well as economic resources. They change from a purely beneficiary SH status to a beneficiary-key SH status.

We consider the 'individual farmer' as a homogeneous SH group. Of course, this is improper as individual farmers' needs vary along with the diversity of cropping situations, farming systems, individual constraints and, even, organization modes. It becomes relevant if we consider only those farmers who share common needs and interests as a SH group to negotiate the specification set of a particular breeding project.

The cotton farmer is generally a smallholder and family head. He employs family or paid labour and in some areas may have access to draught power and tillage equipment. He gets the necessary inputs to grow cotton on credit from the village association, which in turn sells his crop in order to recover the credit. He also grows food crops for his own consumption and sells the surplus on a nearby market. Sometimes, he can raise animals for draught or slaughter.

Most farmers' stakes are essential and linked with short term, elementary needs, with their social status and solidarity links, or with getting their heirs into a better position. Growing cotton is a means to get funding for the children to study, or for organizing traditional and religious ceremonies attached to one's social position. The

Table 3a. Schematic overview of the first scenario's PT (see table 3b for details).

Actor	Stake	Objective	Logic <sup>†</sup>	Negotiation position <sup>‡</sup>		
				C	V	M
Cotton company	APD	=	=	=	=	=
Farmers organization		N	N	N	N	N
Individual farmer		N	N	N	N	N
Cotton research	Director	=	=	=	=	=
	Breeders	=	?	?	?	?

As compared with the initial situation described in Table 2, the box content is new (N) or it does not change (=). The cotton company is represented by its Agricultural Production Director (APD); Cotton research is represented by its Director and by the Breeders.

<sup>†</sup> The actor's rationality is described from the relevant and negotiable elements of specification as compared with breeding and the seed system.

<sup>‡</sup> The actor's position must be coherent with his rationality and taking into account the main elements out of which are: C (ranked breeding and performance criteria), V (Variety number and genetic structures) and M (means to set up in order to achieve the breeding project).

revenues gathered from the crop also contribute to establishing or maintaining status differences.

Cotton farmers consider cotton seed as a strategic production factor. They wish to get high quality seed at a reasonable price: 'quality' here means seed with good germination and high genetic potential in the local cropping systems. Good quality seed should help them to reach their personal production or revenue objectives while minimizing the risks of failure. The selection criteria, and their weighting in the specification, should reflect (i) production stability, (ii) field production, (iii) good agronomic behaviour at field level, (iv) harvestability and (v) harvest cleanliness.

At present, individual farmers have little to say in the choice of varieties which are finalized by research and multiplied by the cotton company. They are not keen to finance directly the work of genetic improvement or to buy seeds at a high cost. However, many farmers are ready to volunteer as experiment-farmers because this responsibility is socially valued. They are also expected to welcome any initiative enhancing their position in the control of seed supply.

The PT places them as individuals as beneficiary SHs. They become key SHs when increasing their political and economic power through organizing in professional organizations. This power was demonstrated in the beginning of the 1990s when farmers refused to grow *glandless* cotton in West Africa because its lower field productivity was not compensated for by higher prices (Lançon, 1995).

We have chosen to simplify the analysis by considering only two organizational levels in this scenario, the cotton farmers' professional organization and the village association (Table 3a). We have shown that the emergent professional organization must be part of the PT. It plays a key role in supporting all cotton growers as individuals as well as their common interests. Its power is increasing even though it has does not yet have many resources. In contrast, the village association does not play a big role. It gets paid for collecting the cotton crop, transporting it to the ginneries and supplying

the inputs to the growers. Its resources are too limited to contract a breeding project on its own. Its stakes may differ greatly from those of the individual farmers.

*Diversified partnership.* A vertical reading of the complete PT (Table 3b) shows that farmers' stakes are only partially represented by the cotton company. The private relationship between the breeders and the APD does not reflect the actual balances of power, with farmers increasingly developing their weight. The breeders have to change their role: the one they play in executing the orders of the cotton company is in conflict with the one they aspire to as referees or independent experts.

When private or professional organizations bear more important economic stakes, they will then be more willing to enter and support a breeding project than individual SHs. As a matter of fact, the actors' wish to contribute to a varietal breeding project varies in line with their confidence in genetic progress. The individual cotton growers have strong expectations of securing their children's or their own essential needs. But an improved variety will only bring a marginal and small contribution to their livelihood. However, a variety with a fibre quality adapted to the market requirements may add to the commodity chain competitiveness and generate huge profits for the cotton farmers' organization instead of losses.

We will try to follow farmers' empowerment by opening up negotiation spaces where they can gradually be included. Starting from a situation in which farmers are not associated in decision making, our strategy will be based on two existing elements:

- (i) State, international agencies, and the cotton company are in partnership to fund research activities.
- (ii) The components of a specification are known although they have not been obtained through a formalized negotiation process.

The first step could be to formalize the specification in elaboration with the present negotiator, i.e. the cotton company's APD. Formalization should lead to recognition of the need to increase the skills needed to elaborate each specification. It should then bring closer to the negotiation table those who know best the constraints to cotton production, i.e. the extension agents and the farmers. This gradual involvement of farmers in the decision process should help them to develop the necessary skills for future and more formal negotiations. Finally, this process should lead farmers to become more actively involved in the decision process and the partnership. By taking farmers' demands more explicitly into account, researchers would benefit by anticipating a formal and predictable demand, which might later be expressed at an institutional level.

*Second scenario: liberalization of the sector.* The cotton company is dismantled. According to this scenario, international pressure forces the State of Cameroon to sell its shares in the cotton company. Private actors take over industrial activities: ginneries and oil mills, input trading, seed cotton transport from the villages to the mills and the carriage of the bales to the harbour. They all share a common interest in increasing the cotton sector's wealth and in the sustainable enhancement of local cotton production (although some of them may run additional activities in other sectors or in other regions). Neither the input suppliers, nor the haulier companies are considered in the

Table 3b. Pan table completed for the first scenario (farmers' empowerment).

Stakeholders	Stakes	Objectives	Negotiation position <sup>†</sup>			
			Ranked breeding and evaluation criteria	Variety number and genetic structure	Commitments	Logic <sup>‡</sup>
Cotton company (SODECOTON)	<ul style="list-style-type: none"> <li>To contribute to the sector's competitiveness through increasing production and improving its quality</li> <li>To facilitate the diffusion of production modes and technologies favourable to increase the competitiveness of each actor of the sector</li> </ul>	<ul style="list-style-type: none"> <li>To improve the volume of production and the average yield</li> <li>To supply the farmers with sufficient quantity of high quality inputs at the critical times</li> <li>To reduce the fibre production costs before shipping</li> </ul>	<ul style="list-style-type: none"> <li>Ginning out-turn</li> <li>Average seed cotton yield</li> <li>Agronomic performances (in adverse conditions, under high infestation, response to fertilizers)</li> <li>Seed size</li> <li>Harvest quality (cleanliness, colour, length, maturity)</li> <li>Humidity and free fatty acids in the seed</li> <li>Germination</li> </ul>	<ul style="list-style-type: none"> <li>Limited number of varieties and easy to reproduce</li> <li>One per market type (when spin mil demand is heterogeneous)</li> </ul>	<ul style="list-style-type: none"> <li>Keen to finance the improvement of ginning out-turn, fibre quality, disease or insect resistance, response to inputs</li> </ul>	<ul style="list-style-type: none"> <li>To secure the company's gin mills supply in sufficient quantity, quality and homogeneity and at a favourable price</li> <li>To give priority to genetic progress as relatively cheap to obtain and simple to spread</li> <li>To simplify and rationalize the organization of seed production in order to reduce fabrication costs and facilitate quality control (purity and germination)</li> </ul>
Farmer Professional organization	<ul style="list-style-type: none"> <li>To promote farmers interests</li> <li>To be recognized as an institution</li> </ul>	<ul style="list-style-type: none"> <li>To get good prices and collective advantages for the farmers</li> <li>To improve their position in the negotiation bodies</li> </ul>	<ul style="list-style-type: none"> <li>Field productivity</li> <li>Agronomic performance</li> <li>Ginning out-turn</li> </ul>	<ul style="list-style-type: none"> <li>Production quality</li> <li>A small number of varieties if the PO is concerned with the seed multiplication</li> </ul>	<ul style="list-style-type: none"> <li>In the short term, determination to support breeding activities</li> <li>In the medium and longer term, the determination may be uncertain</li> <li>Only determined to fund research if the new technology is due to impact significantly on his crop performance</li> </ul>	<ul style="list-style-type: none"> <li>To strengthen its position through occupying the free spaces opened by the institutional changes</li> <li>To take over the seed system especially if the seed are charged to the farmers</li> </ul>
Individual	<ul style="list-style-type: none"> <li>To secure his family and himself future through the education and social promotion of his children</li> <li>To meet the commitments due to his social position</li> </ul>	<ul style="list-style-type: none"> <li>To get sufficient revenues to pay for children scholarship and for social events</li> <li>To reduce the financial risks linked with cotton production</li> </ul>	<ul style="list-style-type: none"> <li>Germination ability</li> <li>Production stability (risk aversion)</li> <li>Field productivity</li> <li>Agronomic performance (field and farm scale)</li> <li>Adaptation to local constraints (late planting, marginal areas, high pest pressure, low input)</li> <li>Easy and clean harvest</li> </ul>	<ul style="list-style-type: none"> <li>A set of varieties suited for very risky local constraints</li> <li>A variety with high potential</li> </ul>	<ul style="list-style-type: none"> <li>Only determined to fund research if the new technology is due to impact significantly on his crop performance</li> </ul>	<ul style="list-style-type: none"> <li>To enhance his legitimacy within his social group</li> <li>To preserve his financial capacity</li> </ul>
Cotton research Director	<ul style="list-style-type: none"> <li>To contribute to the sector's competitiveness through multi disciplinary research</li> </ul>	<ul style="list-style-type: none"> <li>To get funding for cotton research in demonstrating its profitable achievements</li> </ul>	<ul style="list-style-type: none"> <li>Criteria must be cropping system dependent and fixed in co-ordination with several disciplines</li> </ul>	<ul style="list-style-type: none"> <li>Favourable to diversity if this leads to an increased demand</li> </ul>	<ul style="list-style-type: none"> <li>Not ready to raise breeding budget without extra external funding</li> </ul>	<ul style="list-style-type: none"> <li>To stimulate the demand and increase the resources</li> <li>To remind the breeders collective constraints: interdisciplinarity and financial solidarity (the genetic material is one of several components of the crop management system)</li> </ul>
Breeders	<ul style="list-style-type: none"> <li>To contribute to the sector's competitiveness through genetic improvement</li> </ul>	<ul style="list-style-type: none"> <li>To produce outstanding varieties taken over by the actors</li> </ul>		<ul style="list-style-type: none"> <li>The tools and methods to organize the genetic material diversity have to be adjusted</li> </ul>	<ul style="list-style-type: none"> <li>Diversifying the varieties needs extra means</li> </ul>	<ul style="list-style-type: none"> <li>To get necessary recognition and funding to explore all technical possibilities: varieties suited to risky situations and designed for local and specific constraints are more costly to produce or to manage</li> <li>To inform the actors about the limitations</li> </ul>

<sup>†</sup> The actor's rationality is described from the relevant and negotiable elements of specification as compared with breeding and the seed system.

<sup>‡</sup> The actor's position must be coherent with his rationality and taking into account the main elements out of which are: C (ranked breeding and performance criteria), V (variety number and genetic structures) and M (means to set up in order to achieve the breeding project).

Table 4a. Schematic overview of the second scenario's PT (see Table 4b for details.)

Actor	Stake	Objective	Logic <sup>†</sup>	Negotiation position <sup>‡</sup>		
				C	V	M
State	N	N	N	N	N	N
Spin mill manager	N	N	N	N	N	N
Gin mill manager	N	N	N	N	N	N
Oil mill manager	N	N	N	N	N	N
Farmers' organization	=	=	=	=	=	=
Individual farmer	=	=	=	=	=	=
Cotton research Director	=	=	=	=	=	=
Breeders	=	?	?	?	?	?

As compared with the situation described in table 3 (scenario 1), the box content is quite new (N), it has changed (C) or it remains identical (=).

<sup>†</sup> and <sup>‡</sup>: see table 3.

breeding situation, since they have no direct interest, particular objective or criteria to promote in the breeding project.

Once the cotton company has been dismantled, the new actors have to take over the organizational tasks necessary to support cotton production that formerly were run by the company. The State continues to contribute to the activities by retaining a stake in quality control, arbitration, price setting and conciliation, extension and research to serve the commodity chain actors. Besides, a joint-trade cotton organization is set up to look after the common interest of all the sector's participants. It includes the producers, some of the manufacturers (ginning, oil mill), and possibly suppliers or traders involved in transport or import whose activities are linked directly with local cotton production. It is mandated to organize the negotiation between the actors but also to co-ordinate general activities like extension, input or seed supply, seed cotton purchase or promotion. The cotton organization, however, does not appear in the PT. In spite of its importance, it has no autonomy: ideally, its stakes, rationality and resources result from a position negotiated between the actors that participate in the organization.

Individual farmers' expertise is relevant to specify the local constraints addressed by a variety. As in the preceding scenario, the farmers' organization has first to mobilize and manage most of the farmers' collective resources before committing itself with the breeders, and for a sufficient period of time to drive a breeding project. Its stakes and those of its managers may obviously differ from those of the individual farmers, depending on the mechanisms that provide financial and political resources to the organization. The democratic rules compel the farmers' representatives to show they take care of individual farmers' interests related to field production and cotton price. However, the organization may also obtain funds from diverse activities like cotton transport, fibre grading, trade, and export or input sales. In that case, the farmers' representatives must make explicit their stakes and decision rules.

The new situation has been described in Tables 4a and 4b. It is considerably more complex than the first scenario (Table 3), as shown by numerous new elements (N in Table 4a).

Table 4b. Pan table completed for the second scenario (liberalization).

Stakeholders	Stakes	Objectives	Negotiation position†			
			Ranked breeding and evaluation criteria	Variety number and genetic structure	Commitments	Logical
State	<ul style="list-style-type: none"> <li>• To maintain social stability</li> <li>• To distribute resources</li> <li>• To ensure the smooth running of society</li> <li>• To maintain the financial health of the State and its intervention capacity</li> </ul>	<ul style="list-style-type: none"> <li>• To satisfy all the actors and more specially lobbies</li> <li>• To favour local employment</li> <li>• To preserve economic (sector) and environmental balances (bio-diversity)</li> <li>• To prevent collective risks in the long run</li> </ul>	<ul style="list-style-type: none"> <li>• Varying with changing major problems and backers pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Few varieties</li> </ul>	<ul style="list-style-type: none"> <li>• Provides men and infrastructures to the breeding project</li> <li>• Provides men and infrastructures for control and approval process</li> </ul>	<ul style="list-style-type: none"> <li>• To defend the common interest and the equilibrium between regions</li> <li>• To take into account the particular interests of organized lobbies (local authorities, inter-profession, specific actors, etc)</li> <li>• To rule the added value partition between individual enterprise and farmers, profit and taxes</li> <li>• To get locally, sufficient, homogeneous, clean and cheap raw material whatever the other quality components</li> </ul>
Spinning operator	<ul style="list-style-type: none"> <li>• To add value to the cotton fibre</li> <li>• To enhance the competitiveness of the 'yarn and loincloth production' activity</li> </ul>	<ul style="list-style-type: none"> <li>• To reduce the production costs of yarn and fabrics including supply, running and depreciation costs</li> <li>• To enhance the products quality (spinning, weaving and dyeing process)</li> </ul>	<ul style="list-style-type: none"> <li>• Absence of sticky cotton</li> <li>• Lack of contaminants (seed coat fragments, etc)</li> <li>• Fibre quality in bales (length, maturity, cleanliness)</li> </ul>	<ul style="list-style-type: none"> <li>• A single variety</li> <li>• Or batches with homogenous characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Does not support cotton breeding</li> </ul>	<ul style="list-style-type: none"> <li>• Not to disturb commercial crop ginning</li> <li>• To secure the company's gin mills supply in sufficient quantity, quality and homogeneity and at a low price</li> <li>• To produce an homogeneous quality of fibre both at the bale and mill level</li> <li>• To take advantage of local production to satisfy spinners' demand</li> </ul>
Ginning operator	<ul style="list-style-type: none"> <li>• To secure the outlet of the fibre produced</li> <li>• To enhance the competitiveness of the 'fibre production' activity</li> </ul>	<ul style="list-style-type: none"> <li>• To reduce production costs of fibre (supply, running and depreciation)</li> <li>• To enhance product quality (ginning and cleaning process)</li> </ul>	<ul style="list-style-type: none"> <li>• Ginning out-turn</li> <li>• Seed size</li> <li>• Harvest quality (cleanliness, colour, length, maturity)</li> </ul>	<ul style="list-style-type: none"> <li>• One for each collect basin</li> <li>• One for each market type</li> </ul>	<ul style="list-style-type: none"> <li>• Keen to support the improvement of ginning out-turn and fibre quality</li> </ul>	<ul style="list-style-type: none"> <li>• To take advantage of local production to satisfy spinners' demand</li> <li>• To limit the costs due to processing and storage if several varieties were grown</li> <li>• To enhance its position among the SH (in the commodity chain, cotton seed is considered as a by-product)</li> </ul>
Oil mill operator	<ul style="list-style-type: none"> <li>• To add value to the seed of cotton</li> <li>• To enhance the competitiveness of the 'oil and cakes production' activity</li> </ul>	<ul style="list-style-type: none"> <li>• To reduce processing costs of seed (supply, storage, running and depreciation)</li> <li>• To enhance the products quality (storage and extraction process)</li> </ul>	<ul style="list-style-type: none"> <li>• Seed humidity and FFA content</li> <li>• Seed oil and protein content</li> </ul>	<ul style="list-style-type: none"> <li>• No opinion (raw material homogeneity is not required)</li> </ul>	<ul style="list-style-type: none"> <li>• Keen to support research and breeding activities as very dependent of the national production</li> </ul>	<ul style="list-style-type: none"> <li>• To limit the costs due to processing and storage if several varieties were grown</li> <li>• To enhance its position among the SH (in the commodity chain, cotton seed is considered as a by-product)</li> </ul>

Farmer						
Professional organization	<ul style="list-style-type: none"> <li>• To promote farmers interests</li> <li>• To be recognized as an institution</li> </ul>	<ul style="list-style-type: none"> <li>• To get good prices and collective advantages for the farmers</li> <li>• To improve their position in the negotiation bodies</li> </ul>	<ul style="list-style-type: none"> <li>• Field productivity</li> <li>• Agronomic performance</li> <li>• Ginning out-turn</li> <li>• Production quality</li> </ul>	<ul style="list-style-type: none"> <li>• A small number of varieties if the PO is concerned with seed multiplication</li> </ul>	<ul style="list-style-type: none"> <li>• At a short pace, determination to support breeding activities</li> <li>• At a medium and longer pace, the determination may be uncertain</li> </ul>	<ul style="list-style-type: none"> <li>• To strengthen its position through occupying the free spaces opened by institutional changes</li> <li>• To take over the seed system especially if the seed are charged to the farmers</li> </ul>
Individual	<ul style="list-style-type: none"> <li>• To secure his family and himself future through the education and social promotion of his children</li> <li>• To meet the commitments due to his social position</li> </ul>	<ul style="list-style-type: none"> <li>• To get sufficient revenues to pay for children scholarship and for social events</li> <li>• To reduce the financial risks linked with cotton production</li> </ul>	<ul style="list-style-type: none"> <li>• Germination ability</li> <li>• Production stability (risk aversion)</li> <li>• Field productivity</li> <li>• Agronomic performance (field and farm scale)</li> <li>• Adaptation to local constraints (late planting, marginal areas, high pest pressure, low input)</li> <li>• Easy and clean harvest</li> </ul>	<ul style="list-style-type: none"> <li>• A set of varieties suited for very risky local constraints</li> <li>• A variety with high potential</li> </ul>	<ul style="list-style-type: none"> <li>• Only determined to fund research if the new technology is due to impact significantly on his crop performance</li> </ul>	<ul style="list-style-type: none"> <li>• To enhance his legitimacy within his social group</li> <li>• To preserve his financial capacity</li> </ul>
Cotton research						
Director	<ul style="list-style-type: none"> <li>• To contribute to the sector's competitiveness through multi disciplinary research</li> </ul>	<ul style="list-style-type: none"> <li>• To get funding for cotton research by demonstrating its profitable achievements</li> </ul>	<ul style="list-style-type: none"> <li>• Criteria must be cropping system dependent and fixed in co-ordination with several disciplines</li> </ul>	<ul style="list-style-type: none"> <li>• Favourable to diversity if this leads to an increased demand</li> </ul>	<ul style="list-style-type: none"> <li>• Not ready to raise breeding budget without extra external funding</li> </ul>	<ul style="list-style-type: none"> <li>• To stimulate the demand and increase the resources</li> <li>• To remind the breeders collective constraints: interdisciplinarity and financial solidarity (the genetic material is only one component of the crop management system)</li> </ul>
Breeders	<ul style="list-style-type: none"> <li>• To contribute to the sector's competitiveness through genetic improvement</li> </ul>	<ul style="list-style-type: none"> <li>• To produce outstanding varieties taken over by the actors</li> </ul>		<ul style="list-style-type: none"> <li>• The tools and methods to organize the diversity of genetic material have to be adjusted</li> </ul>	<ul style="list-style-type: none"> <li>• Diversifying the varieties needs extra means</li> </ul>	<ul style="list-style-type: none"> <li>• To get necessary recognition and funding to explore all technical possibilities: varieties suited to risky situations and designed for local and specific constraints are more costly to produce or to manage</li> <li>• To inform the actors about the limitations</li> </ul>

† As compared with the negotiable components of the specification, breeding and seed system.

*Diversified strategies based upon partnership and provision of a service.* When just formed, farmers' organizations have initial interests that converge with the breeders' interests. Their main goal being to be recognized as institutions by others, they look for allies and tend to appear favourable to research. However, their interests might differ in the long run. Once institutionalization has been achieved, the leaders may concentrate on internal stakes, and democratic governance might drive their point of view closer to that of the individual members they represent. These are generally receptive to research goals provided immediate impacts are expected. The breeders should then seek both to get closer to individual farmers' expectations and to build up a stable relationship over the long term with the farmers' organization. This means diversifying the breeding objectives as well as establishing new relationships based upon mutual confidence, shared goals, a better knowledge of each other and assurance of the long term commitment which is needed for varietal development.

On the other hand, the new context is favourable to private funding. The enterprises need adaptative research to raise (short term) or sustain (long term) their profits whereas the State and international aid agencies are pulling out and do not legitimate any more the organizational tandem of cotton company–cotton research.

From this analysis, we propose two complementary strategies:

- The first is founded on a partnership with SHs (farmers organizations, joint-trade organizations, non-governmental organizations and State) on the basis of participatory breeding projects designed to answer a local problem specified by a set of environmental, social and agronomic constraints. As some of these problems may be widely spread, this programme could benefit from regional networking and be supported by aid agencies.
- The second aims at raising breeders' credibility and at forging narrow links with the other economic actors. Industrial needs are diverse. They could provide some good opportunities for research to diversify its financial resources through the development of profitable provision of services, like breeding projects based upon specific criteria.

Used in a complementary way, these strategies strengthen each other and contribute to maintaining the breeders at the heart of the industry. They rely on making two distinct formal relationships explicit: partnership on the one hand and provision of services on the other. Cotton producers and private industries are in conflict for the global sector's profit repartition. The breeders would then feel uncomfortable if trying to maintain the same quality of relationship with both actors.

Decentralized and regionalized breeding programmes should favour synergies and productivity gains, and provide access to a larger pool of funding (donors, private enterprises, or organizations with a regional mandate). On the other hand, it may discourage the main national backers (State, private companies, bilateral aid agencies) from remaining committed to local development. To prevent that risk, such programmes should only be set up through formalized commitments with organizations recognized by the local actors.



Table 5a. Schematic overview of the third scenario's PT (see Table 5b for details).

Actor	Stake	Objective	Logic <sup>†</sup>	Negotiation position <sup>‡</sup>		
				C	V	M
State	N	N	N	N	N	N
Private seed company	N	N	N	N	N	N
Cotton company	APD	=	C	=	=	C
Farmers organization	N	N	N	N	N	N
Individual farmer	N	N	N	N	N	N
Cotton research	Director	=	=	=	=	=
	Breeders	=	C	C	?	?

As compared with the situation described in Table 3 (scenario 1), the box content is quite new (N), it has changed (C) or it remains identical (=).

The cotton company is represented by its agricultural production director (APD); <sup>†</sup> and <sup>‡</sup>: see table 3.

### *Third scenario: the seed market is freed*

*Institutional research is no longer central.* Several private companies wish to enter the African seed market, and thus, the country decides to adopt a regulation which protects breeder's rights. The cotton company decides to put national and foreign breeders in competition.

As compared with the first scenario, the PT must include the seed companies as emergent actors. Their strategies are bound to vary according to the local market's attractiveness and its prospects. They could decide: (i) to settle for the long run through developing local breeding programmes designed to create adapted genetic material; or (ii) to use the local market as an opportunist outlet for the varieties created elsewhere. The first option is favourable to local development, whereas the second could go along with predatory pricing (and corruption) to destroy local seed and breeding capacity.

*Other strategies associating partnership and provisions of services.* Under scenario 3, the breeders must carry on creating varieties, but they also have to promote, demonstrate and sell their capability in order to reinforce their legitimacy, which is threatened by direct competition. They have to demonstrate their peculiar expertise and the value they can add for the whole sector's benefit or for the key SHs that are ready to support their activities.

Private seed companies that enter the local market have their own stakes and strategies. An international seed company may temporarily accept losing profits locally in order to win over or to knock down the other local actors. Such a global strategy make the strictly local actors become more fragile as regards seed supply. It could be the public research's responsibility to prevent or limit this kind of risk through promoting the preservation of a local-client oriented breeding programme, independent from the private companies individual strategies.

A first strategy aims at increasing the breeders' legitimacy through developing or strengthening breeding activities in partnership with local actors. This put the breeders in a favourable position to claim for resources from the local SHs and agencies specialized in local development. When a seed company's objectives are opportunist, its interests may collide with many of the commodity chain actors. The

Table 5b. Pan table completed for the third scenario (seed market open to competition).

Stakeholders	Stakes	Objectives	Negotiation position <sup>†</sup>			
			Ranked breeding and evaluation criteria	Variety number and genetic structure	Commitments	Logical
State	<ul style="list-style-type: none"> <li>• To maintain social stability</li> <li>• To distribute resources</li> <li>• To ensure the smooth running of society</li> <li>• To maintain the financial health of the State and its intervention capacity</li> </ul>	<ul style="list-style-type: none"> <li>• To satisfy all the actors and more specially lobbies</li> <li>• To favour local employment</li> <li>• To preserve economic (sector) and environmental balances (bio-diversity)</li> <li>• To prevent collective risks in the long run</li> </ul>	<ul style="list-style-type: none"> <li>• Varying with changing major problems and backers pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Favourable to diversification for an improved service to the actors</li> </ul>	<ul style="list-style-type: none"> <li>• Provides men and infrastructures to the breeding project</li> <li>• Provides men and infrastructures for control and approval process</li> </ul>	<ul style="list-style-type: none"> <li>• To back up the cotton company's position in front of the other actors and the other backers as long as it contributes to the local development policy of the State</li> </ul>
Private seed company	<ul style="list-style-type: none"> <li>• To take over the whole solvent market of cotton seed</li> </ul>	<ul style="list-style-type: none"> <li>• To settle in the local market by producing specific varieties for that market</li> <li>• Or to make a limited sale immediately profitable in order to get rid of existing stocks</li> </ul>	<ul style="list-style-type: none"> <li>• The local market criteria may differ from the ones they are used to</li> <li>• Strong pressure to include high adding-value genes (genetic modification)</li> </ul>	<ul style="list-style-type: none"> <li>• Varieties easy to protect, adding a lot of value (hybrids or <i>terminator</i> genes) and with limited adaptation costs</li> </ul>	<ul style="list-style-type: none"> <li>• May contribute to fund risky breeding projects</li> </ul>	<ul style="list-style-type: none"> <li>• To knock out competition in order to take a prominent position in the profitable market segments</li> <li>• To keep on a long term basis the confidence of the local actors</li> <li>• Or to use the market as secondary and use it as an opportunist outlet</li> </ul>
Cotton company (SODECOTON)	<ul style="list-style-type: none"> <li>• To contribute to the sector's competitiveness through increasing production and improving its quality</li> <li>• To facilitate the diffusion of production modes and technologies favourable to increasing the competitiveness of each actor of the sector</li> </ul>	<ul style="list-style-type: none"> <li>• To improve the volume of production and the average yield</li> <li>• To supply the farmers with sufficient quantity of high quality inputs at the critical times</li> <li>• To reduce fibre production costs before shipping</li> </ul>	<ul style="list-style-type: none"> <li>• Ginning out-turn</li> <li>• Average seed cotton yield</li> <li>• Agronomic performances (in adverse conditions, under high infestation, response to fertilizers)</li> <li>• Seed size</li> <li>• Harvest quality (cleanliness, colour, length, maturity)</li> <li>• Humidity and free fatty acids in the seed</li> <li>• Germination</li> </ul>	<ul style="list-style-type: none"> <li>• Limited number of varieties and easy to reproduce</li> <li>• One per market type (when spin mill demand is heterogeneous)</li> <li>• Favourable to competition between several breeders if it provides a greater choice with no extra cost.</li> </ul>	<ul style="list-style-type: none"> <li>• Keen to finance the improvement of ginning out-turn, fibre quality, disease or insect resistance, response to inputs</li> </ul>	<ul style="list-style-type: none"> <li>• To secure the company's gin mill supply in sufficient quantity, quality and homogeneity and at a favourable price</li> <li>• To give priority to genetic progress as relatively cheap to obtain and simple to spread</li> <li>• To simplify and rationalize the organization of seed production in order to reduce fabrication costs and facilitate quality control (purity and germination)</li> </ul>

Farmer Professional organization	<ul style="list-style-type: none"> <li>• To promote farmers interests</li> <li>• To be recognized as an institution</li> </ul>	<ul style="list-style-type: none"> <li>• To get good prices and collective advantages for the farmers</li> <li>• To improve their position in the negotiation bodies</li> </ul>	<ul style="list-style-type: none"> <li>• Field productivity</li> <li>• Agronomic performance</li> <li>• Ginning out-turn</li> <li>• Production quality</li> </ul>	<ul style="list-style-type: none"> <li>• A small number of varieties if the PO is concerned with the seed multiplication</li> </ul>	<ul style="list-style-type: none"> <li>• At a short pace, determination to support breeding activities</li> <li>• At a medium and longer pace, the determination may be uncertain</li> </ul>	<ul style="list-style-type: none"> <li>• To strengthen its position through occupying the free spaces opened by the institutional changes</li> <li>• To take over the seed system especially if the seed are charged to the farmers</li> </ul>
Individual	<ul style="list-style-type: none"> <li>• To secure his family's and his own future through the education and social promotion of his children</li> <li>• To meet the commitments due to his social position</li> </ul>	<ul style="list-style-type: none"> <li>• To get sufficient revenues to pay for children scholarship and for social events</li> <li>• To reduce the financial risks linked with cotton production</li> </ul>	<ul style="list-style-type: none"> <li>• Germination ability</li> <li>• Production stability (risk aversion)</li> <li>• Field productivity</li> <li>• Agronomic performance (field and farm scale)</li> <li>• Adaptation to local constraints (late planting, marginal areas, high pest pressure, low input)</li> <li>• Easy and clean harvest</li> </ul>	<ul style="list-style-type: none"> <li>• A set of varieties suited for very risky local constraints</li> <li>• A variety with high potential</li> </ul>	<ul style="list-style-type: none"> <li>• Only determined to fund research if the new technology is due to impact significantly on his crop performance</li> </ul>	<ul style="list-style-type: none"> <li>• To enhance his legitimacy within his social group</li> <li>• To preserve his financial capacity</li> </ul>
Cotton research Director	<ul style="list-style-type: none"> <li>• To contribute to the sector's competitiveness through multi disciplinary research</li> </ul>	<ul style="list-style-type: none"> <li>• To get funding for cotton research by demonstrating its profitable achievements</li> </ul>	<ul style="list-style-type: none"> <li>• Criteria must be cropping system dependent and fixed in co-ordination with several disciplines</li> </ul>	<ul style="list-style-type: none"> <li>• Favourable to diversity if this leads to an increased demand</li> </ul>	<ul style="list-style-type: none"> <li>• Not ready to raise breeding budget without extra external funding</li> </ul>	<ul style="list-style-type: none"> <li>• To stimulate the demand and increase the resources</li> <li>• To remind the breeders collective constraints: interdisciplinarity and financial solidarity (the genetic material is only one component of the crop management system)</li> </ul>
Breeders	<ul style="list-style-type: none"> <li>• To contribute to the sector's competitiveness through genetic improvement</li> </ul>	<ul style="list-style-type: none"> <li>• To produce outstanding varieties taken over by the actors</li> </ul>		<ul style="list-style-type: none"> <li>• The tools and methods to organize the diversity of genetic material have to be adjusted</li> </ul>	<ul style="list-style-type: none"> <li>• Diversifying the varieties needs extra means</li> </ul>	<ul style="list-style-type: none"> <li>• To get necessary recognition and funding to explore all technical possibilities: varieties suited to risky situations and designed for local and specific constraints are more costly to produce or to manage</li> <li>• To inform the actors about the limitations</li> </ul>

† As compared with the negotiable components of the specification, breeding and seed system.  
PO: Professional organization.

breeders may then oppose it and pretend to control the whole local seed market in order to protect the common interest. On the other hand, if the company is able to satisfy part of the local demand for improved varieties, the breeders may look to establish an implicit or explicit sharing of the territory. They may then concentrate on creating varieties suited to a more specific demand, more local and less profitable (i.e. niche strategy), with the development agencies' support.

As in the second scenario, international networking could be part of the strategy. Local breeders could benefit by being part of a collaborative network with several research institutions.

Another strategy could aim at accessing the R&D budgets of private companies or specialized agencies. When a seed company does not wish to invest massively in the country, it might charge the breeders to run complementary activities: creating and displaying basic genetic material (pre-breeding), integrating patented genes in local germplasm (back crossing), breeding exotic genetic material into seeds for specific cropping systems or creating genetic material on special request (see scenario 2). Of course, this can only work if the private company trusts the breeders' capability.

If the company settles into a new environment (irrigated cotton, for example), the breeders may propose development of a specific breeding project partnership, sharing risks, costs and potential profits. Of course, such an association should not prevent the breeders from also being seen to stand by the other SHs' interests.

#### DISCUSSION

In this paper we propose a PT tool to support stakeholder analysis. The PT mainly focuses on the decision process and on the key SHs who might be included in that process. It can be used as a representation complementary to the more general SA method which has been formalized, for example, by ODA (1995). Stakeholder analysis is generally conducted by an independent researcher on the basis of interviews with SHs or 'desk stories' conducted within the SH community. Others are run on participatory lines, with the SHs, which tends also to reveal the SHs' differing perceptions of what other SHs' logics are. In our case, the PT was written by two independent analysts. The strategic options which are proposed need to be discussed and validated by local SHs before being applied.

We have taken a particular case, i.e. cotton breeding in the north of Cameroon, to illustrate the PT method. Is this method context specific or can it be used in other research projects?

*A priori*, the potential for application appears unlimited. Most, if not all human activities, take place 'in a situation', and human sciences have developed methods to understand human conduct, which is, generally speaking, situation dependent. It has been argued that the human being is always tuned into the world around him and must always find solutions to the various problems he faces as a condition of being and remaining alive (see, for example, Dilthey, 1883; Husserl, 1970).

The PT results from the confrontation of a professional activity (cotton breeding), a general context (the cotton commodity chain), and a local context which includes the

relationship and the balance of power between the actors. As professionals, breeders have a finalized view of the situation: they want to find a solution that both realizes their project and satisfies all the actors. This gives sense to the situation and helps the problem and the solution to emerge. The actors' framing of the world around them is bound to the organization of the local sector and to the existence of a group of actors sharing a stake and a problem. Conversely, the items we have used in this example to describe the actors' behaviour, their stakes, objectives, and logic, may certainly be relevant in many other breeding situations, whatever the context or the problem.

The application domain of the method is wide. It can apply to the analysis of any problematic situation in which a group of actors share an interest in collaborating in a collective project while keeping partially divergent stakes. The method can be applied to every research project which target several beneficiaries; breeding projects are a good example. However, the negotiable items in the specification may depend upon the plant's reproductive system (variety structures), the actors' expectations of agronomic traits and heredity (breeding and evaluation criteria).

In this paper, we have tried to classify, represent and simplify in order to make understandable a complex human situation. This attempt to model the complexity can be tested through its efficiency in solving a problem (Le Moigne, 1999). The PT method could become a convenient tool for breeders to use as a routine either during the elaboration of a breeding project or in its course. It could be used either for conceiving an individual strategy or shared with the other SHs for developing collaborative actions based upon constructivist approaches (Jiggins and Röling, 1997).

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