TAKING INTO ACCOUNT THE SOCIAL EFFECTS OF COMPETITION BETWEEN PRODUCTS
Example of Croatian pig industries

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What is the issue?

- Very often, the functioning of one product chain causes important remote effects through other product chains
- because both chains are competing or working in synergy

Sources: fotosearch

What is the issue?

- Is there a conceptual model to design the Boundaries for social LCA studies, if willing to capture this phenomena ?

- What are Economics and Management sciences (strategy) supplying us to design ***competitive boundaries of SLCA*** ?

Strategy is interested in values generated by firms (among them is the social value).

Strategy keeps tools to define the boundaries of firms activities

Are they useful in SLCA?

I- DESIGN of the PERIMETER

What is fair perimeter to analyse social effects of **competition** between products/ firms ?

§1 1 - <u>WIDTH</u> OF THE FIELD

From macro to firm : Find the good level of analysis of the environment

- GENERAL ENVIRONMENT (Pestel)

- Too much broad, too far
- Affects company, but neither direct exchanges nor reciprocity.

- COMPETITIVE ENVIRONMENT

- Industry (sector)

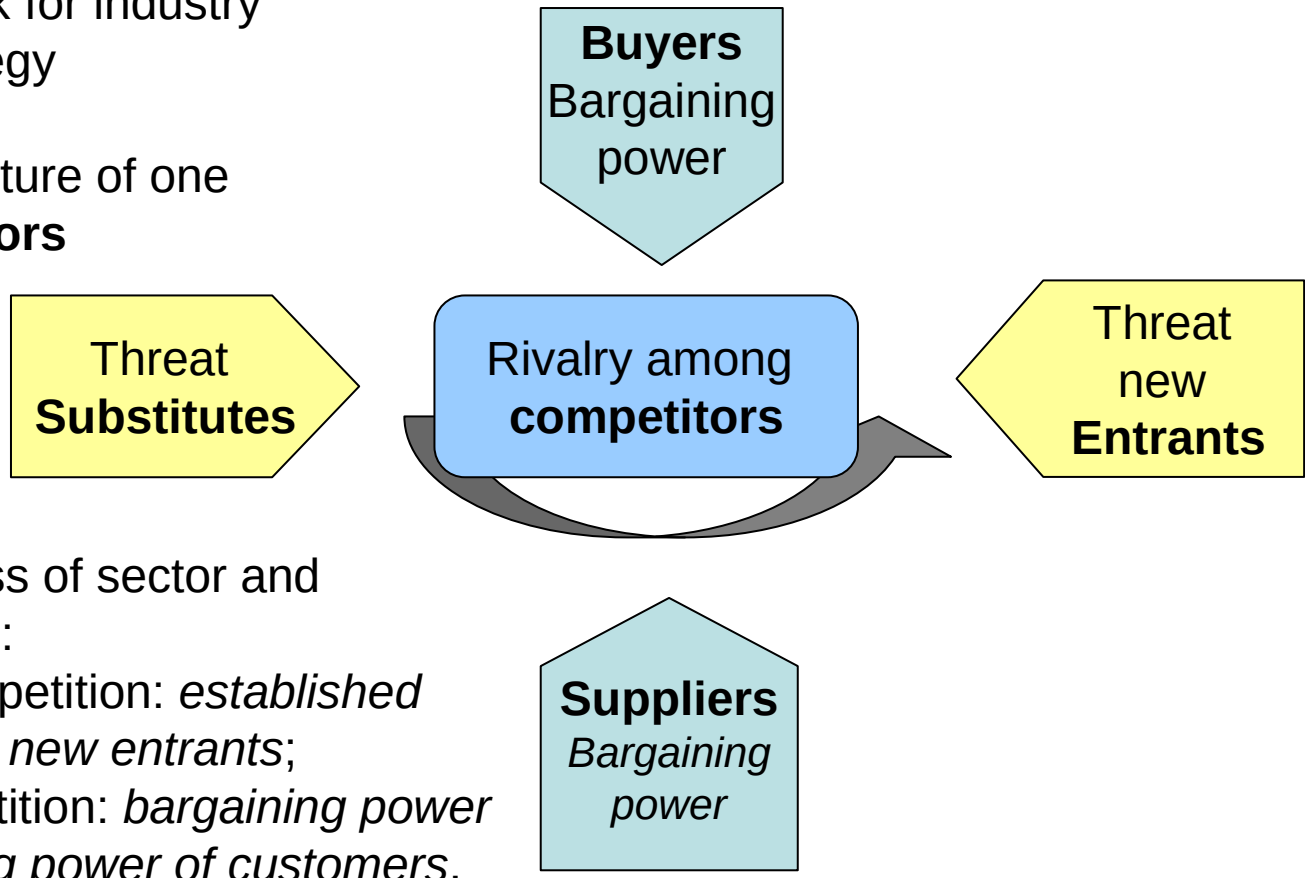
Firms using similar technology of production : products narrowly substitutable
But not always in competition on the same markets
Strategy (Porter) chooses this level of analysis to study interactions between firms

Traditional model for industry analysis

PORTER'S 5 FORCES (1980)

Competitive context of an activity or product (SBU)

"Five Forces" is a framework for industry analysis and business strategy development :
- Analyses competitive structure of one given industry : **identify actors**



- **Defines** the attractiveness of sector and **intensity between firms** :
- 3 forces 'horizontal' competition: *established rivals, substitute products, new entrants*;
- 2 forces 'vertical' competition: *bargaining power of suppliers and bargaining power of customers*.

- **Substitute** : products outside the industry (sector), which becomes a competitor in certain circumstances (price, shortage,...)
- **Entry of new competitors** : Profitable markets attract new firms (creation, diversification...)

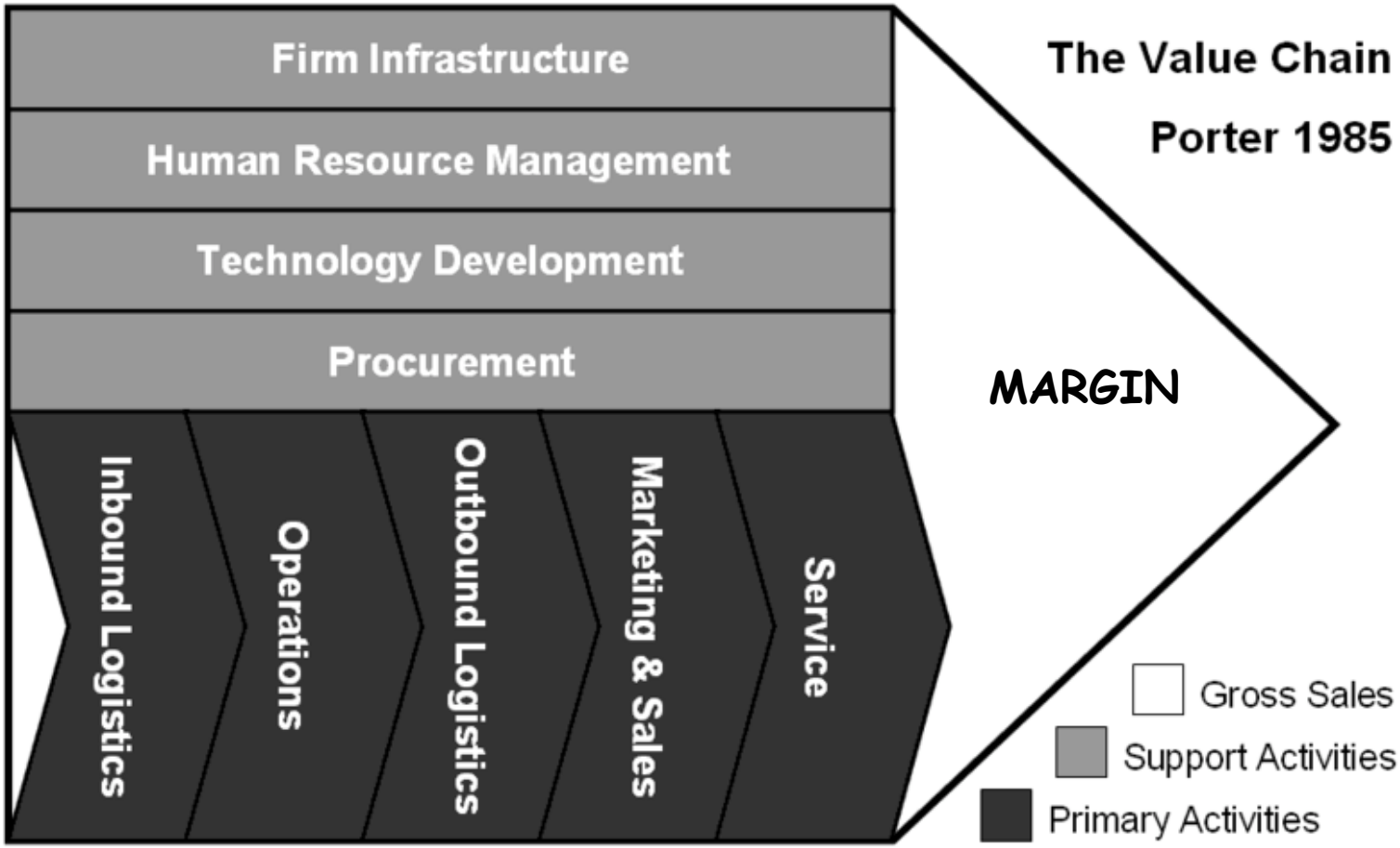
Limits 5 forces model :
- sectors are tight, supposed not to cross.
- model is static, does not integrate movement and changes in relationships.
- connections are limited to competition (# collaboration).
- It is not possible to identify layers of performance and value in new environments in networks (Lecocq and Yami, 2005).

12 - DEPTH OF THE FIELD : VALUE CHAIN

- Porter specifies analysis of connections between firms by integrating the relationships of interdependence, generated upstream and downstream, by the value creation (vertical).

  → "**Value Chain**" (1985)

- *Value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (combination of physical transformation and inputs from various producer services), delivery to final consumers, and final disposal after use.*



Value Chain cuts out (separates) activity of firm in sequences of elementary operations to identify sources (origins) of value creation (and also costs) which create the competitive advantage (Stratégor, 1993)

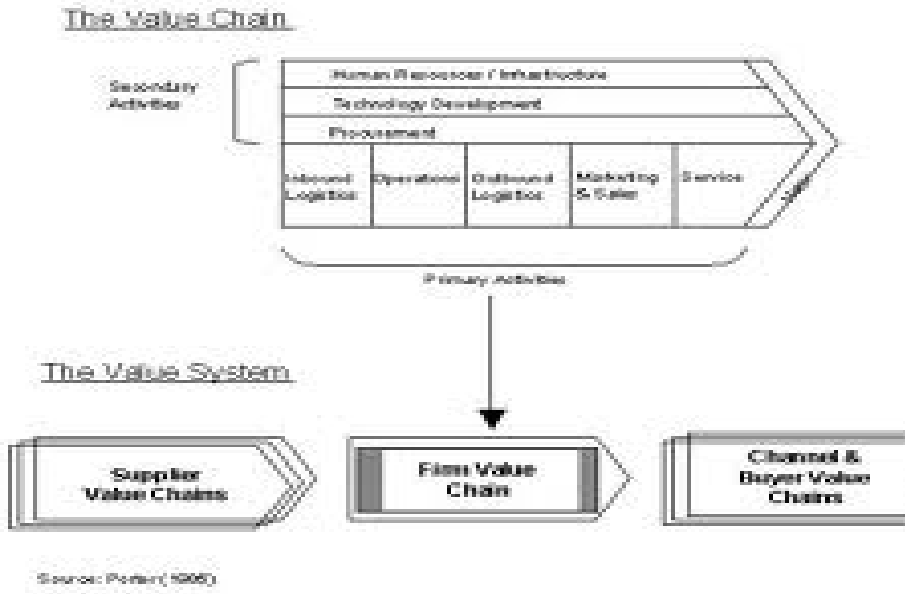
USEFULNESS

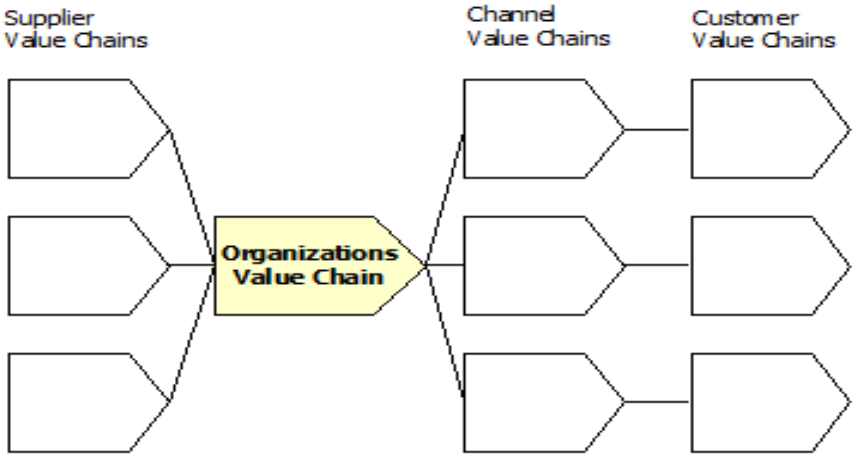
- Seeks where value is created in the firm.
- Benchmark: compares with value chain of other firms.
- Extend value-chain beyond individual firms :

- Locates value chain of one firm in the global value chain of the product,

- Applies to whole supply chains and distribution networks (intégrating value created by suppliers and customers)

= VALUE SYSTEM (/ added value chain)





Industry wide synchronized interactions of local value chains create an extended value chain (even through countries) : **GLOBAL VALUE CHAIN**

Gereffi, Humphrey and Sturgeon (2005) study hierarchical relationships and **power** in Global value chains.

They highlight **central firms** which “control” the rest of the chain by imposing conditions of production (price, quantity, quality). 2 forms frequently met: “buyer driven” chain or “producer driven” chain.

• Value chain approach (/ global value chain) is often used in LCA (Life Cycle Assessment).

<u>LIMITS of VALUE CHAINS</u> :

Only linear and vertical relations are taken into account

- Focus on circulation of good or service from producer to consumer, and on **vertical relations** between purchasers and suppliers

- Undervalues forms of competition (**competitors**, **substitutes**) and collaboration on the same segment (level) of the chain, which are, however, important.

(Ponte and Gibon, 2005)

- **The** (French) **FILIERE**

- Approaches developed by French institutions of research for the analysis of distribution systems for the agricultural goods.

- Present succession of operations which, leaving upstream raw material (or intermediate product) leads downstream,

  after several stages of transformation/valorization to one or more end products on the level of the consumer :

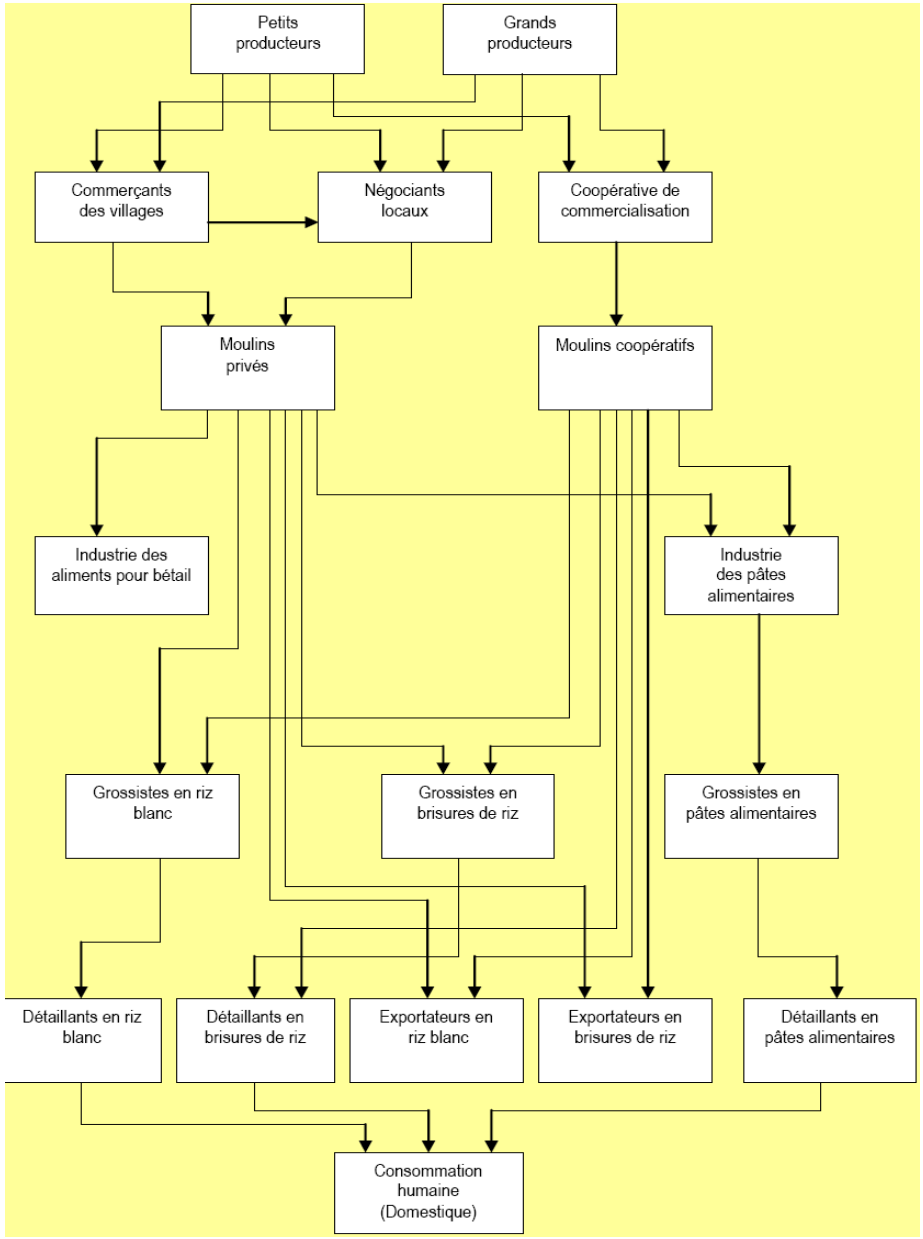
  E*conomic agents units which contribute directly to the development of a finished product*.

- French economists have built their model on the basis of creative process of the added-value, described by American research, and adapted to the vertical integration of French agriculture (Kaplinsky and Morris, 2000)

- This approach insists on flows between companies and on the relationships of dependences and predominance among the various actors of the chain.

Rice Filière in Thailand

(Tallec and Bockel, 2005, FAO)



- Producers
- traders
- mills
- transformation industry
- wholesalers
- consuming retailers and exporters

°USEFULNESS

- **Includes** concepts **value chains** and global value chains (*and links to Global Commodity Chain*)
- Particularly **recommended for agricultural** analysis
- **Compares** respective **competitiveness** of filières (comparison margins/value) and strategies of the actors (competitors)
- Cross several analyses (agents, flows, values, modelled calculations)

°Limits

- Static
- Not broad enough *(still vertical analysis, competitors included but without links)*
- No substitutes

°13- CROSSING WIDTH AND DEPTH: the **STRATEGIC ARENA**

Concept first proposed by Rotchild (1984), and Bidault (1988) France

Arena is *the most extensive design of the competing field, namely the unit of the filière (industry) substitutable and complementary which contributes to satisfy the same elementary need*.

Concept proposed in order to comprehend the elements which are likely, beyond the competitors, to have influences on the behaviours of the company (Bidault, 1988).

→ *Arena about food, data processing, transport, energy…*

Arena allows to identify together, in a relatively exhaustive way, companies and sectors which are in direct competition or indirect competition with various degrees, or likely to become competitors.

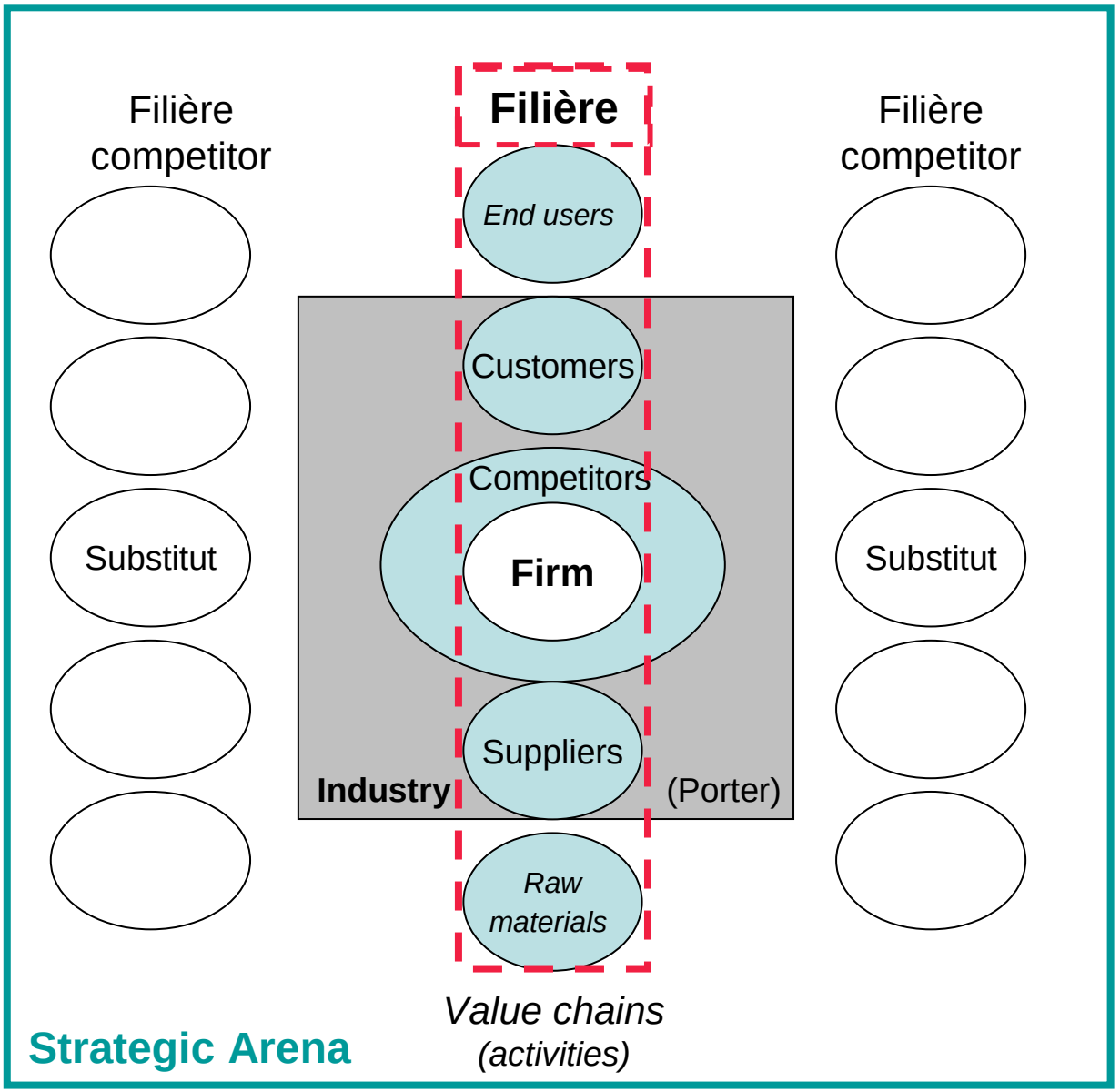
STRATEGIC ARENA

Building arena requires to answer 3 key questions:

1- Which basic need do the activities (products and services) of the Firm meet ?

2- Which are the substitutes being able to fulfil this basic need?

3- Which are the filières which correspond to these products and services substitutes?



Rotchild (1984), Bidault (1988)

- **USEFULNESS**

  Combines advantages of :

- **value chains**
- **competitive environment** (Porter's Forces model)
  it is possible to extend the usual comparison between firms (direct **competitors**)
- chains in competition or collaboration (**value chains**, within **filière**), with the indirectly concurrent filières by **substitutes**.

Main limits :

- Static
- Links are simple (# networks)

II- THE **ACTUATION** OF THE FIELD: **COMPETITIVE DYNAMICS**

New research school (1990) tries to explain actual competitive context and strategic movements (and interactions)

(Grimm et Smith, 1992 -1997)

New competitive landscape results in an increased competition, characterized by speed, flexibility and innovation in reaction to the fast changes of the environment.

(Bettis et Hitt, 1995)

Strategies are dynamics : actions → reactions competitors

(Hoskisson et al. 1999)

- **Competitive advantage** (Porter) is only **temporary**
  (Langley 1997)

- "**Hypercompétition**" (D' Aveni, 1995) :

Autodestructive competition, where strategy is a perpetual race towards next source of temporary competitive advantage.

- **Competitive interaction** (interdependence) :
  - *Dyadic Competitive Interaction* : *action/reaction*
  - Multimarket competition / Multipoint Rivalry
    → suicide war or c*ollusive behaviour (or coopetition)*

- **- <u>COOPETITION</u>** (coopertition)

Neologism coined to describe **cooperative-competition**

Coopetition occurs when competitors companies work together for some parts of their business where they think they have no competitive advantage

and where they believe they can share common costs.

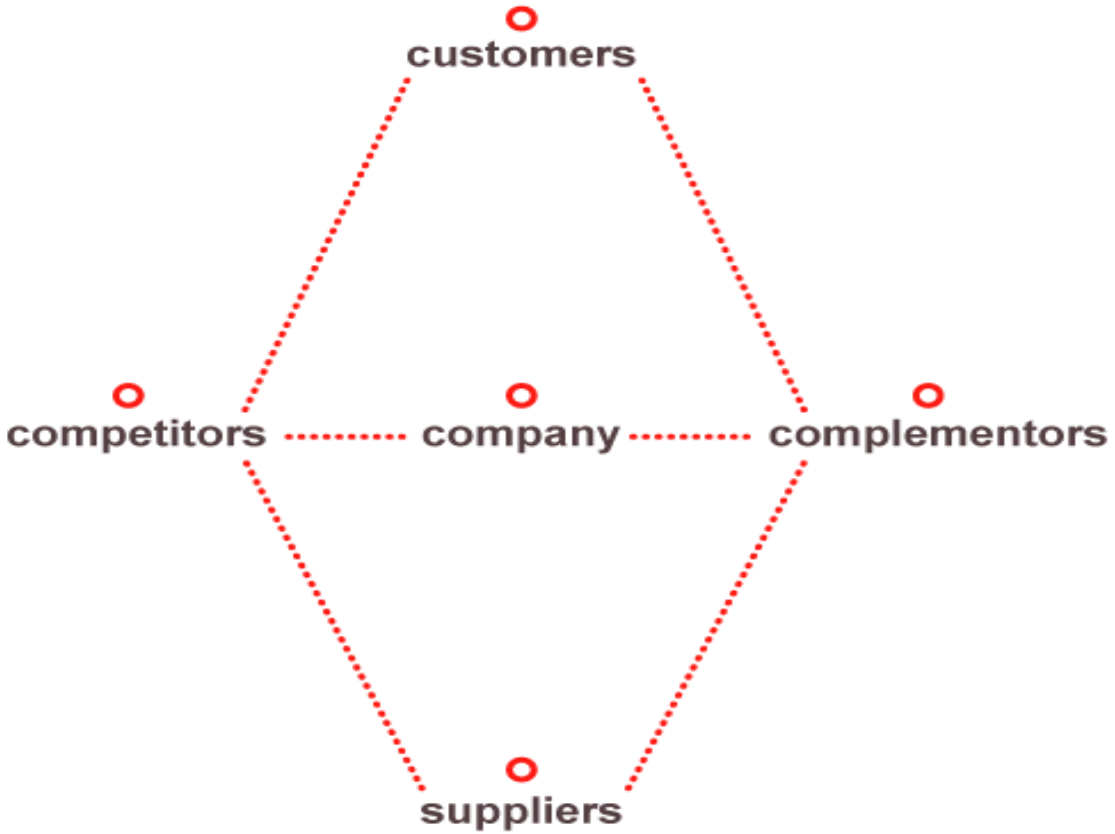
J-V PSA -Toyota sharing components for city car (Peugeot 107, Toyota Aygo, Citroën C1). Companies save money on shared costs while remaining fiercely competitive in other areas.

Co-opetition Model : the **VALUE NET**

(Brandenburger et Nalebuff 1996)

- Co-opetition model provides a framework to identify and explain the underlying mechanisms in a firm's environment, and how these mechanisms can be changed to the firm's advantage.

Brandenburg and Nalebuff identified
4 types of players that any company faces:



Main academic contribution :

identification and justification of the role played by **COMPLEMENTORS**. Business makes more than competing for market share in the current market.

"*A player is a* **complementor** *if customers value your products more when they have that player's product, than when they have your product alone*"

(Brandenburger and Nalebuff 1996)

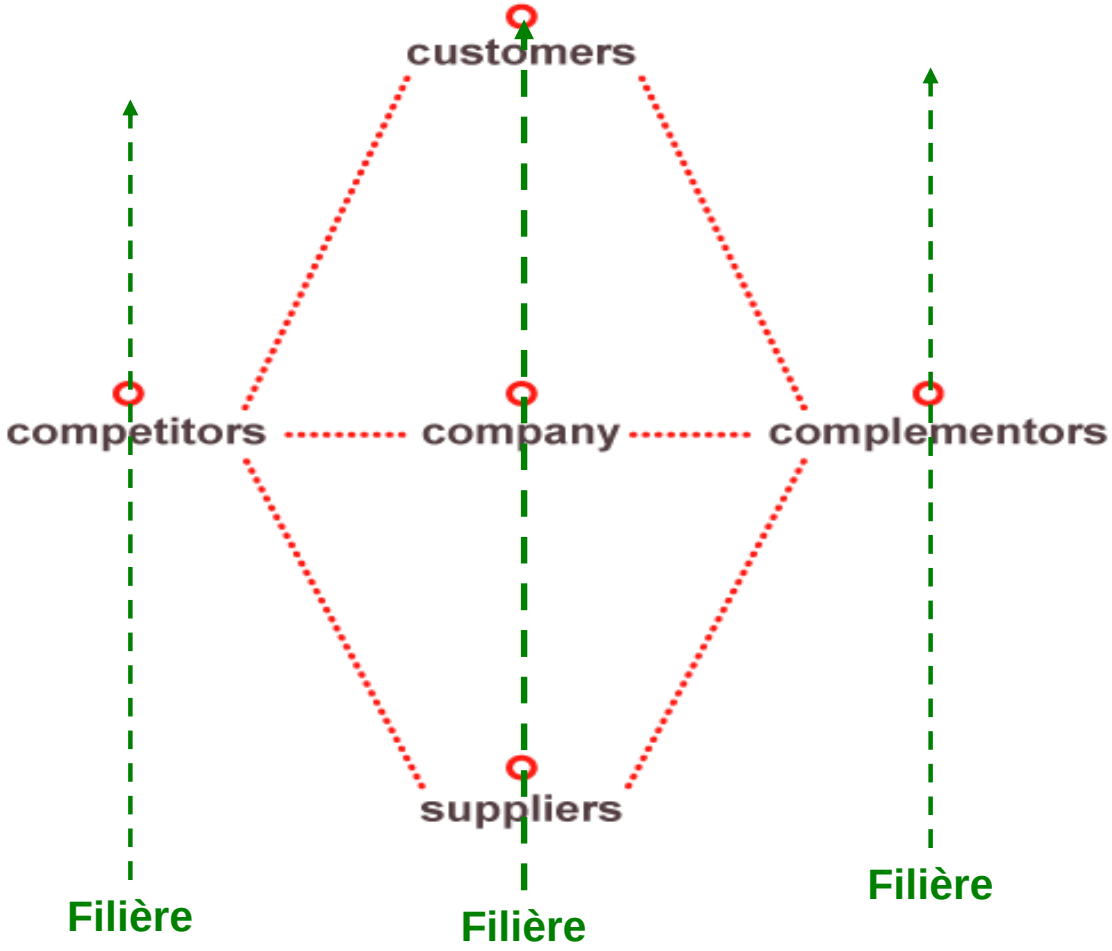
Other firms independently make products or services that increase *your* offerings' value to mutual customers

Most companies benefit from complementors :

- Nitendo's domination in video games industry in 90's/ complementors = games developers.
- Digital-camera / home photo printers
- Microsoft /McCaffy
- Intel / Inside

! A single player can have more than one role simultaneously. A player can even be both competitor and complementor at the same time.

Value-net link between filières (value chain) ?



(value chain)

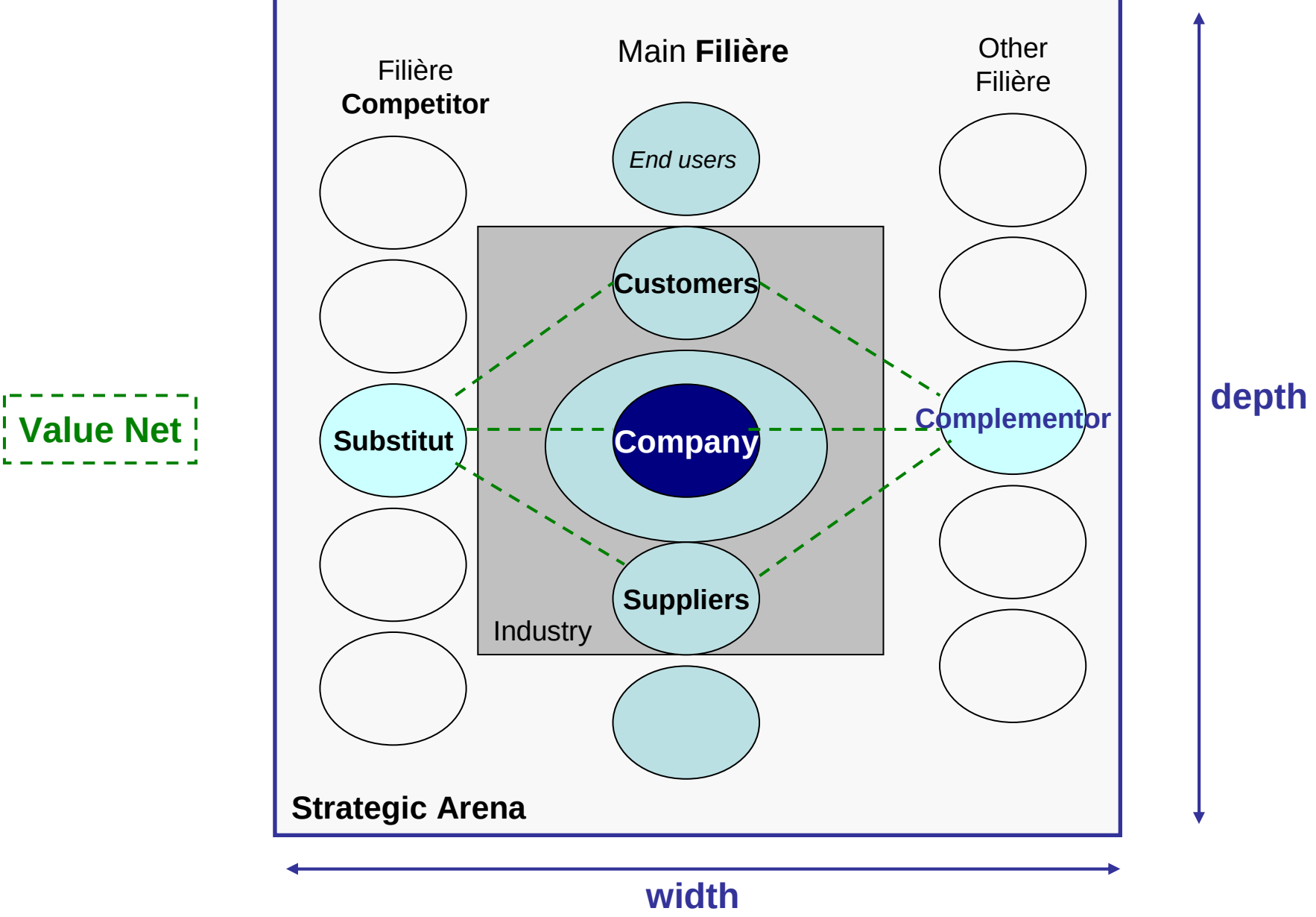
Our proposal

→ Boundaries ?

to take into account social effects of competition between products :

the COMPETITIVE PERIMETER of SLCA

Competitive perimeter of SLCA



TAKING INTO ACCOUNT THE SOCIAL EFFECTS OF COMPETITION BETWEEN PRODUCTS

III- EXAMPLE OF CROATIAN PIG INDUSTRIES

Agriculture in Croatia

4 400 000 inhabitants
Process of integration to EU going on
45% population lives in rural areas

Agriculture plays an important role in economy (about 7 % of Croatian GDP) and above all in employment: 100 000 persons are officially employed in agro-food sector.

449 896 holdings (average 2,4 ha) in 2003, among them 300 000 units < 2 ha

190 672 registred farms (average 5,28 ha) in 2009

The five counties with pigs farms

Long tradition in pig farming :

33% in livestock production
31 845 small producing units

76% of pigs are kept on small family properties

75% family farms keep up to 5 sows

Croatia imports piglets and pork meat

County with high Pig production

Main city in the North

Source: Wikipedia
The counties of Croatia

Characteristics of the three Croatian pig systems

	Part-time family farms N=7	**Full-time family farms** N=6	**Farm enterprises** N= 4
Number of breeding sows on farm	**2.0 +- 1.7**	**43.2+-32.1**	**100 and 1350**
Number of pigs on farm (excluding piglets)	1 to 8	12 to 590	100 to 12 000
Farm size	4.3 +-5.2	42.2+-44.3	Not relevant
Number of labour units (full time equivalent)	**3.0 +-2.2**	**3.0+-0.8**	**7.0+-5.5**
Feed origin (%) **-on farm** **-off farm/purchased** **-unknown**	 14 71 15	 83 17 0	 50 25 25

Source: from Wellbrock et al. (2009, page 29)

Photo: Animal Friends Croatia Pig Farm

Zdravko Skarec's new 1,120-pig finishing farm at Polonje, Croatia. It complies with EU specifications for pig production.

3 Photos: The PigSite News Desk, 26/02/2008

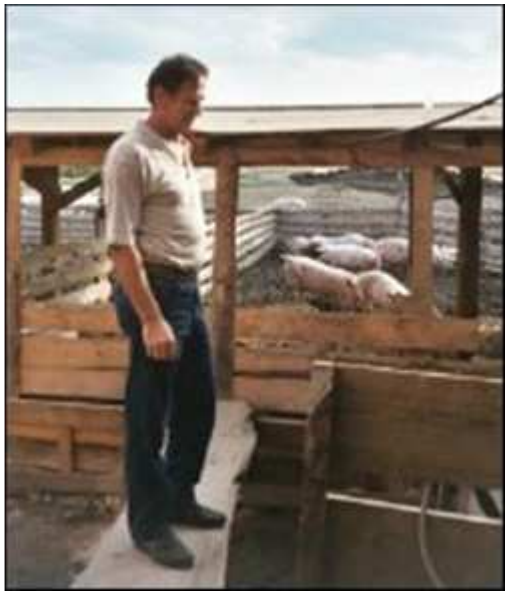
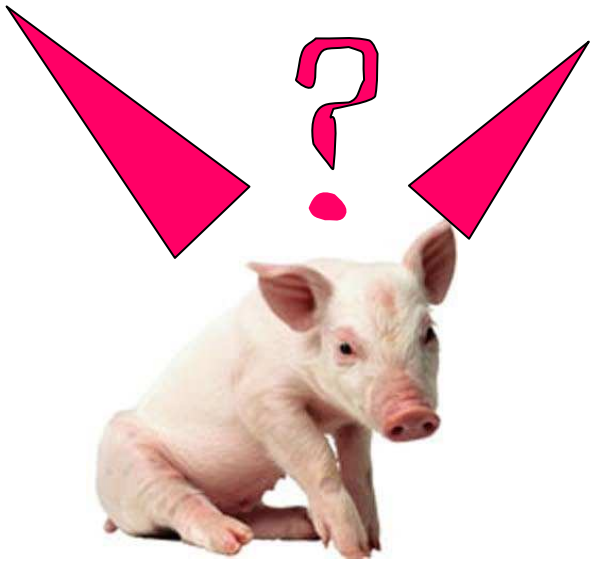


Photo: USAID/anne Marie DiNardo
Anton Hetmanek at his pig farm in Croatia, 11/05/2009



Each new building has 16 pens. They are environmentally controlled and use the PigNic automatic feeding system

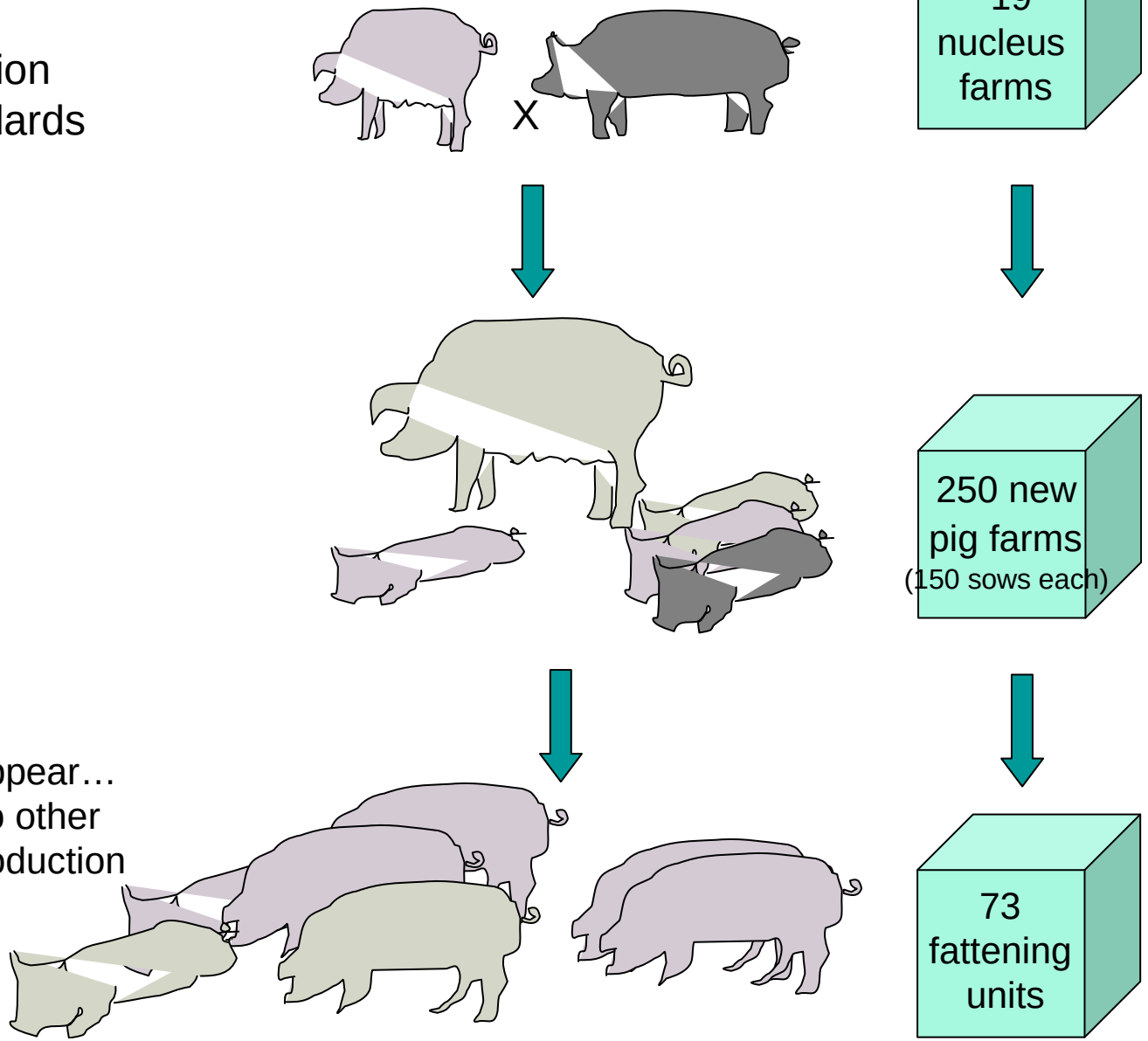
*www.**usaid**.gov/stories/croatia/fp_croatia_**pig**.html -*

A possibility ?

To comply with EU production (economic, ecologic) standards « Pig Production Development programme » (2005)

Best than current pig farming situation from economical and ecological points of view

Expected social effects:
« pigs smallholders would disappear… affected farmers could switch to other Activities such as ecological production or fruit production »
(from Wellbrock et al., 2010)



Why assessing the number of rural jobs involved in the change ?

Unemployment remains one of the key economic problems : est. 17,6% in 2011 (from CIA World Factbook) and especially in rural areas. Rural people are poorer, older, and more often women than urban people. « The significant decline in agricultural employment is due to increasing rural-urban migration and declining labour opportunities in the sector » (Arcotrass, 2006)

Modifying sectors on societal level, which has an influence on how unemployment impacts the individual, and state for Croatian society

Modifying factor identifiable on societal level	**State of the factor for Croatian society as a whole**	**State of the factor for the rural areas**
Level of unemployment in society	Key economic problem	Declining labour opportunities in agriculture
Level of social security	Health and pension system	31 099 unpaid family workers have been accounted for (2001).
Labour market programmes	Benefit system for official workers Against discrimination (2010)	Benefit system for official workers Not for unpaid family workers
Level of social security to increase income	Social assistance up to subsistance level per family Social inclusion programme (2011)	Smallholders can receive income support, and apply for rural development schemes.

Jobs are gaining more and more social value, especially in rural areas..

Source of modifying factors: from **Jorgensen et al., 2010,** page 381

Our aim is assessing the gain/loss of rural jobs by functional unit, if the Pig Production Development programme was implemented.

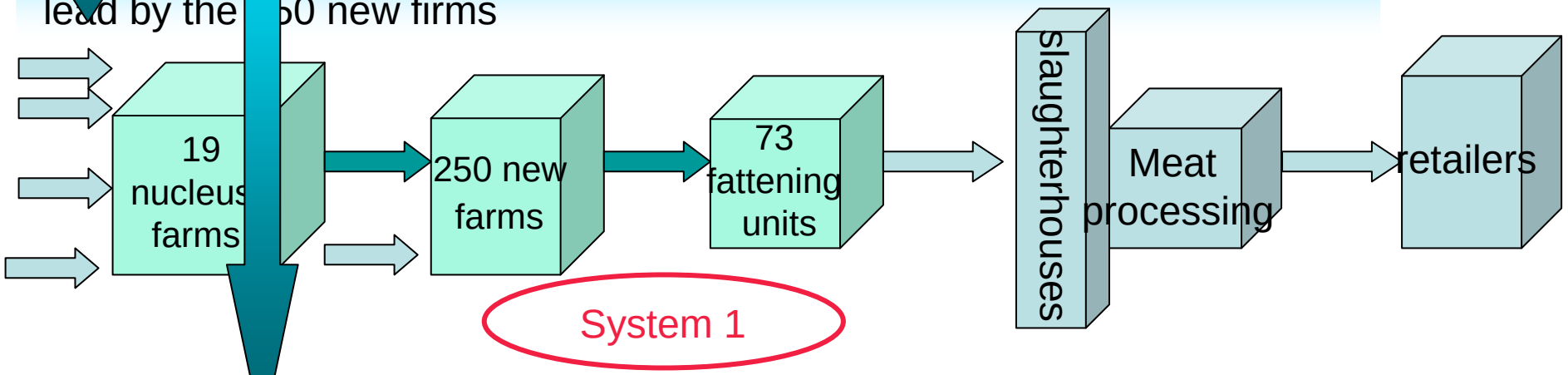
The functional unit = pig meat delivered by one new farm of 150 sows.

Photos: Fotosearch

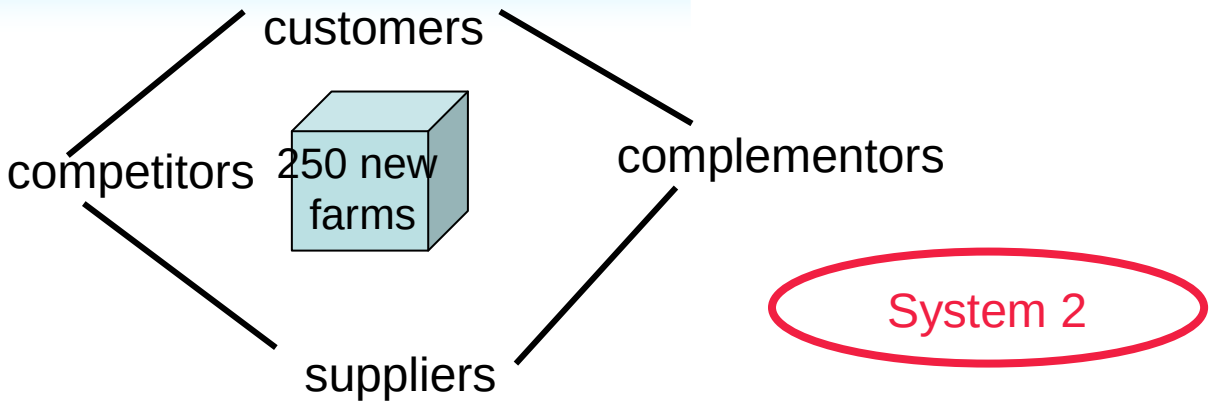
Two different ways to set the border of the system

The 25 new pig farms stands for the principal firm leading the system
There i no « consumer stage » nor « end-of-life » assessment.

-C classi l way is picturing the social life cycle like the « **value chain** »
lead by the 50 new firms

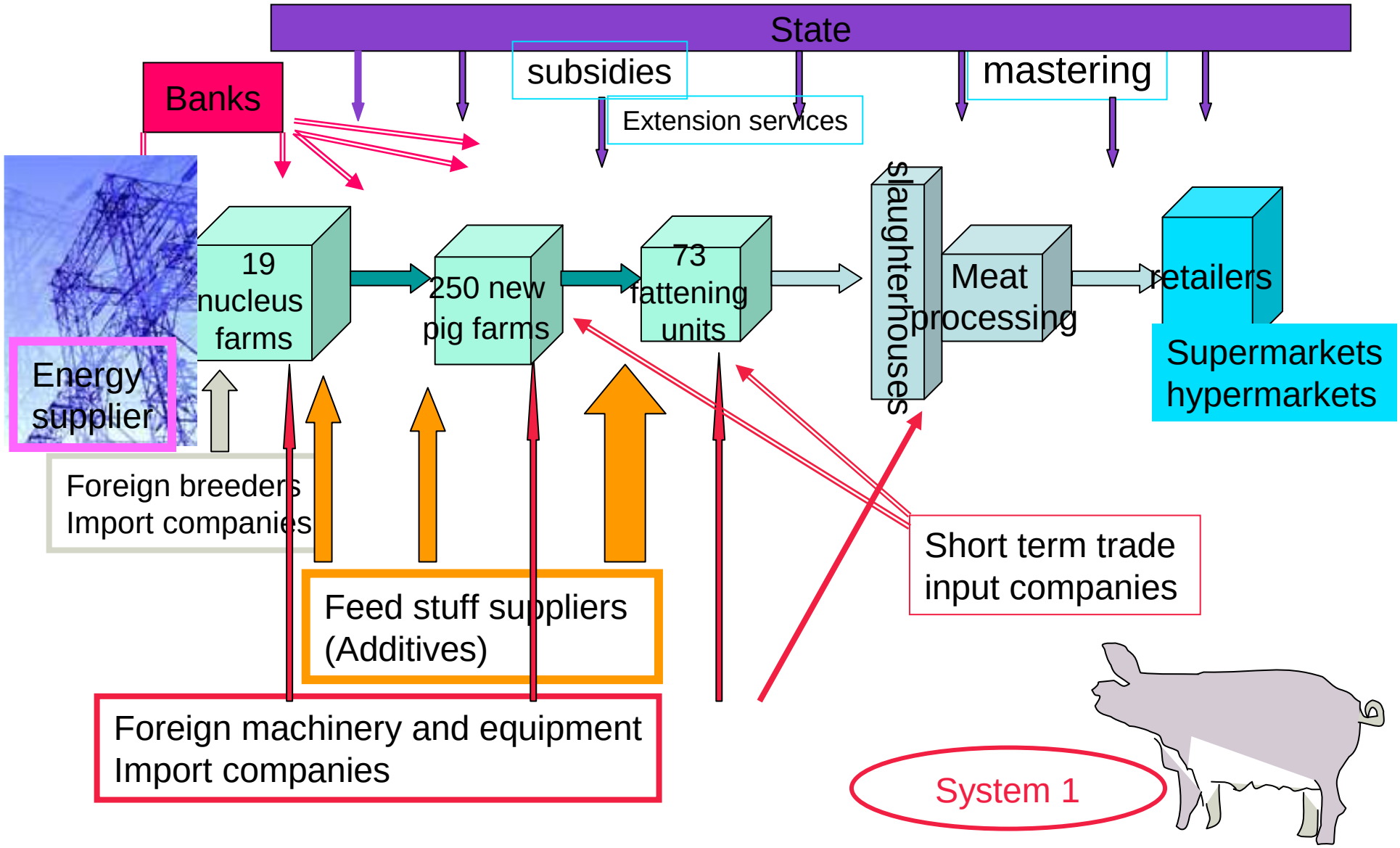


-Another way is picturing the « **Competitive perimeter** »
around the 250 new firms



Using the value-chain

to describe the organisations linked by « services »

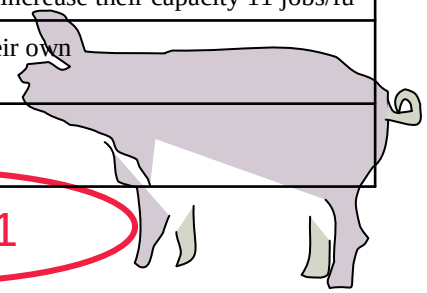


Calculating the rural jobs gain of system 1

Organisations included in the Plan chain	Comments	Implementation of the cut-off criteria and number of rural jobs created/functional unit
State services	Subsidies (direct payments, to investments and rural development), veterinary services, Extension services	As the main issue is European compliance of slaughterhouses, the State services are not depending on the Plan farms.
9 Croatian Banks	They would likely provide funding for new units	It is a very new field for Croatian banks, as they don't really fund agriculture to date. They don't depend on the Plan farms.
Equipment (troughs, water places…) and farm **machinery** (tractors…) suppliers	All the facilities would be imported	Not dependent of the plan
Energy supplier	National operator electricity (HEP) One supplier of gas (INA)	Not dependent of the Plan
Short-term trade input companies	They would provide "additives" to plan farms, and short-term leans.	They are delivering feedstuffs for rabbits and poultry also, and are in synergy with the Plan.
Feedstuff inputs	They are included in the farms works, except additives.	For poultry also, not dependent of the plan
19 Nucleus farms supplying breed sows and boards	Created from nothing	Depending of the plan 0,15 qualified rural jb/fu
250 new farms (rearing piglets) and	Creating from nothing	Depending on the plan 1,65 qualified rural job/fu
73 fattening units (for pigs)	Creating from nothing	Depending on the plan Jobs Included above
Slaughterhouses and processing meat facilities	196 slaughterhouses and 800 meat processors to date.	Depending on the Plan. The equivalent of 120 slaughterhouses and 480 meat processors would increase their capacity 11 jobs/fu
Removing unit of the corps of animals	Only one for whole Croatia	Plan farms would manage it by their own
Supermarket and hypermarket	They move their capacity according to their customers, not regarding the meat supply.	Not dependent of the Plan.

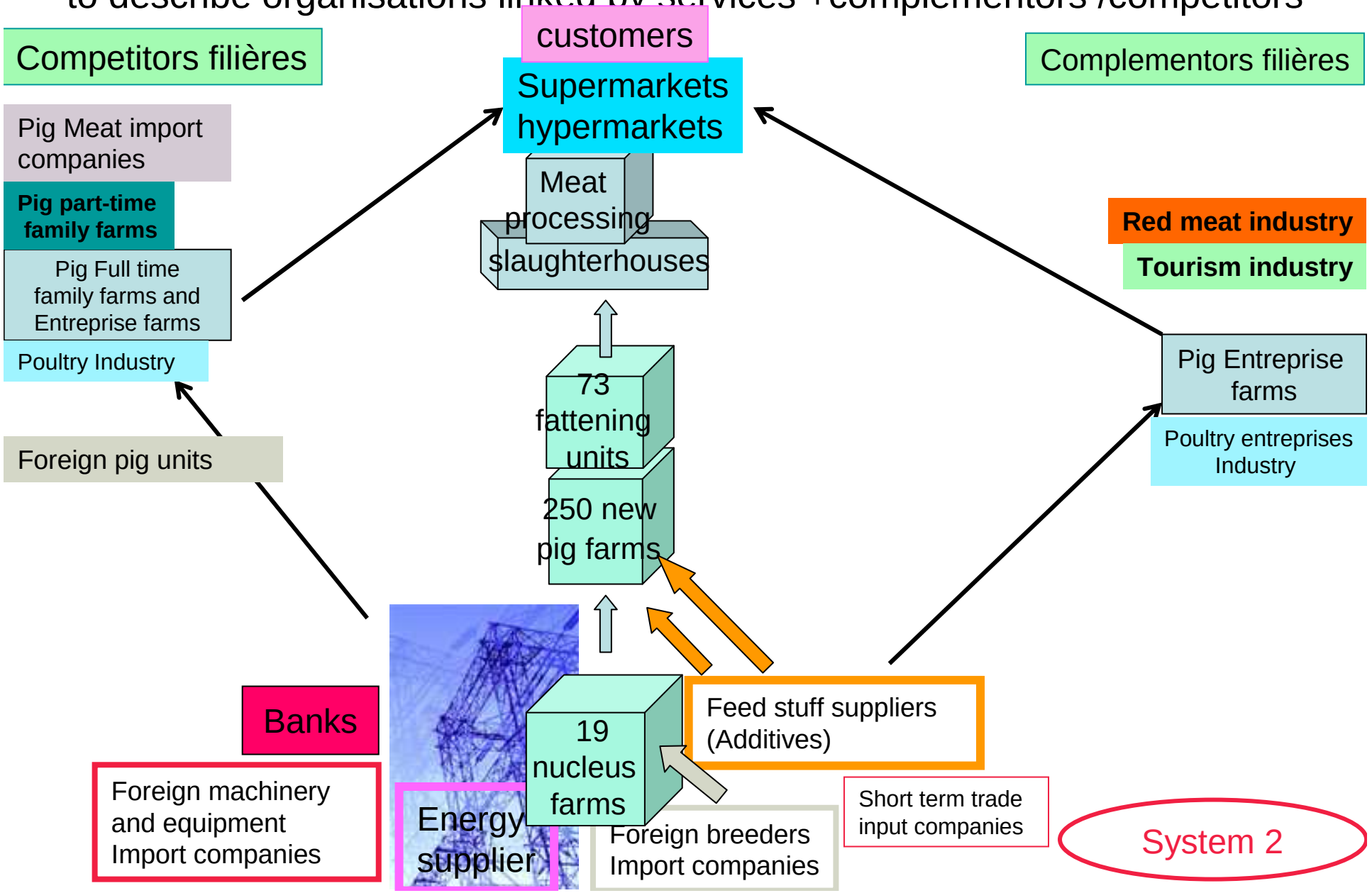
13 qualified rural jobs gain/one new farm (250 sows)

System 1



Using Competitive perimeter

to describe organisations linked by services +complementors /competitors



Calculating the rural jobs gain/loss of system 2

The dominant effect is competition between the Plan and the pig full-time family farms !

	Current full time family farm pig industry		**Planned pig industry**	
	The set up of one new enterprise farm of 150 sows would destroy:		The set up of one new enterprise farm of 150 sows would create:	
		In average		In average
Within the farm or enterprise farm	jobs of people working on 3,5 family farms (42 sows, fattening and crops)	10,5+-2,8 labour units (full time equivalent)	Create jobs of people working on the enterprise farm (including crops and fattening units)	1,65 jobs
Feed supply	Jobs of people linked with purchased feedstuff	Not relevant	Jobs linked with purchased feedstuff	Not relevant
Breeding sows and boards supply	Jobs linked with purchased animals	Not relevant, exchanges between farms.	Jobs created in the nucleus farm for 150 sows	Need 37,5 new sow/year, so 37,5/493 sows produced in one nucleus farm, so 37,5/493 x 2 jobs = 0,152 jobs.
Slaughterhouses and meat processors	Jobs linked to overcapacity because seasonality	1 job X ½ slaughterhouse + 1/2 job X 2 meat processors.	Jobs linked with 2 400 non seasonal replacing seasonal heads.	No new job created

+ 1,8 skilled rural jobs gain/one new farm (250 sows)
- 12 rural jobs (whose some unpaid workers)

System 2

Calculation of thresholds

- Is there a threshold in the number of full-time family farm pig activities being replaced by the Plan?
- The capacity of the Plan is 150 farms x 250 sows x 16 pigs/sow/year = 600 000 pigs/year
- The capacity of the pig full time family farms is 1 095 farms x 42 sows x 15 pigs/sow/year = 689 850 pigs/year

Conclusion

- Crossing strategic arena and Value Net for the representation of the competitive perimeter in social LCA delivers useful insights about all the organisations cooperating or competing with the main firm's filière.

- It helps setting bounderies of the relevant system to put under scrutiny when:
  - Competing/coopering chains of products are at stake
  - The indirect effects of the chain are more (or as much) important than the direct ones

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