Dealing with the variability and heterogeneity of raw materials: the governance of sustainable fruit-based supply chains

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Dealing with the variability and heterogeneity of raw materials:
the governance of sustainable fruit-based supply chains

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Introduction

➢Agricultural products are living materials characterized by their variability and heterogeneity.

➢ This complexity makes difficult for growers and processors to control the food quality which is increasingly relevant and demanding.

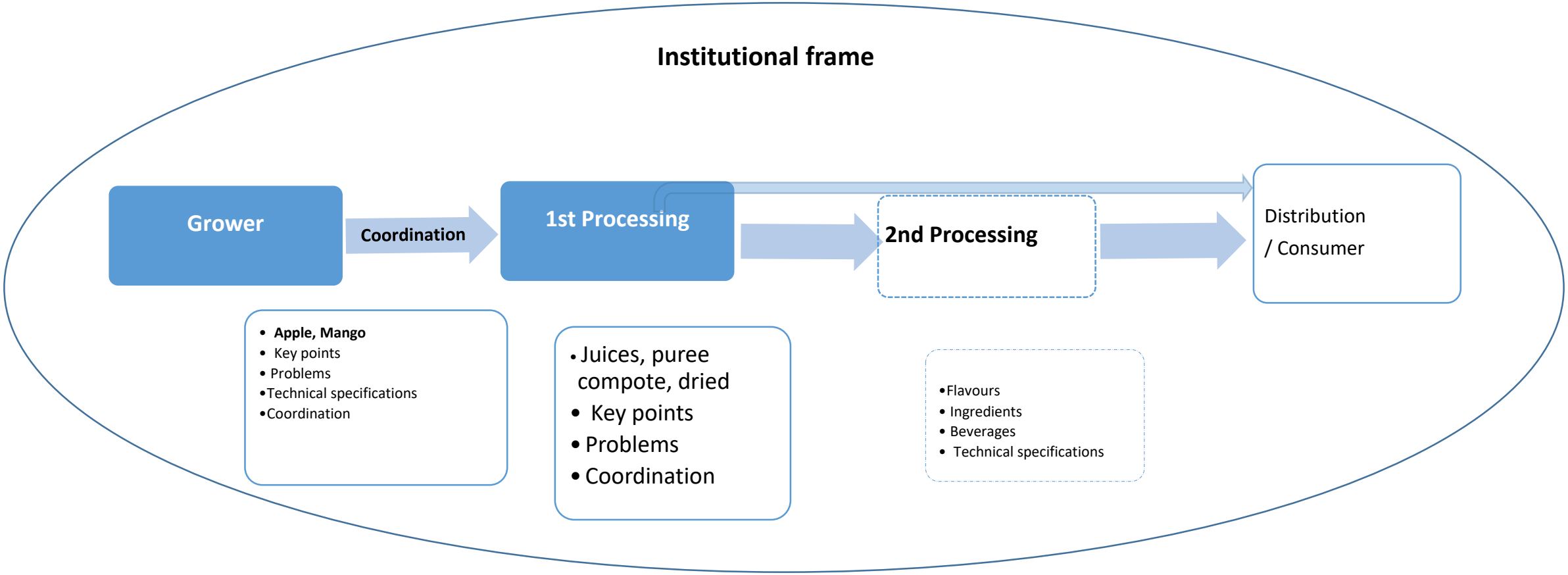
➢Quality has evolved towards a more comprehensive concept that beyond the organoleptic and nutritional attributes, involve the respect for sanitary, social and ecological considerations.

Our research question is:

➢*How do firms manage the variability and the heterogeneity of fruits within the supply chains ?*

➢Our main framework applied is New Institutional Economics: **Institutional analysis** by Menard (2017, 2018) and **Transaction Cost Economics** (Wiliamson 1996, 2008).

Approach


Institutional frame
Grower
Coordination
1st Processing
2nd Processing
Distribution
/ Consumer
• Apple, Mango
• Key points
• Problems
•Technical specifications
•Coordination
• Juices, puree compote, dried
• Key points
• Problems
• Coordination
•Flavours
• Ingredients
• Beverages
• Technical specifications

Theoretical Framework:

- The agricultural supply chains are receivers and providers of ecosystem services.

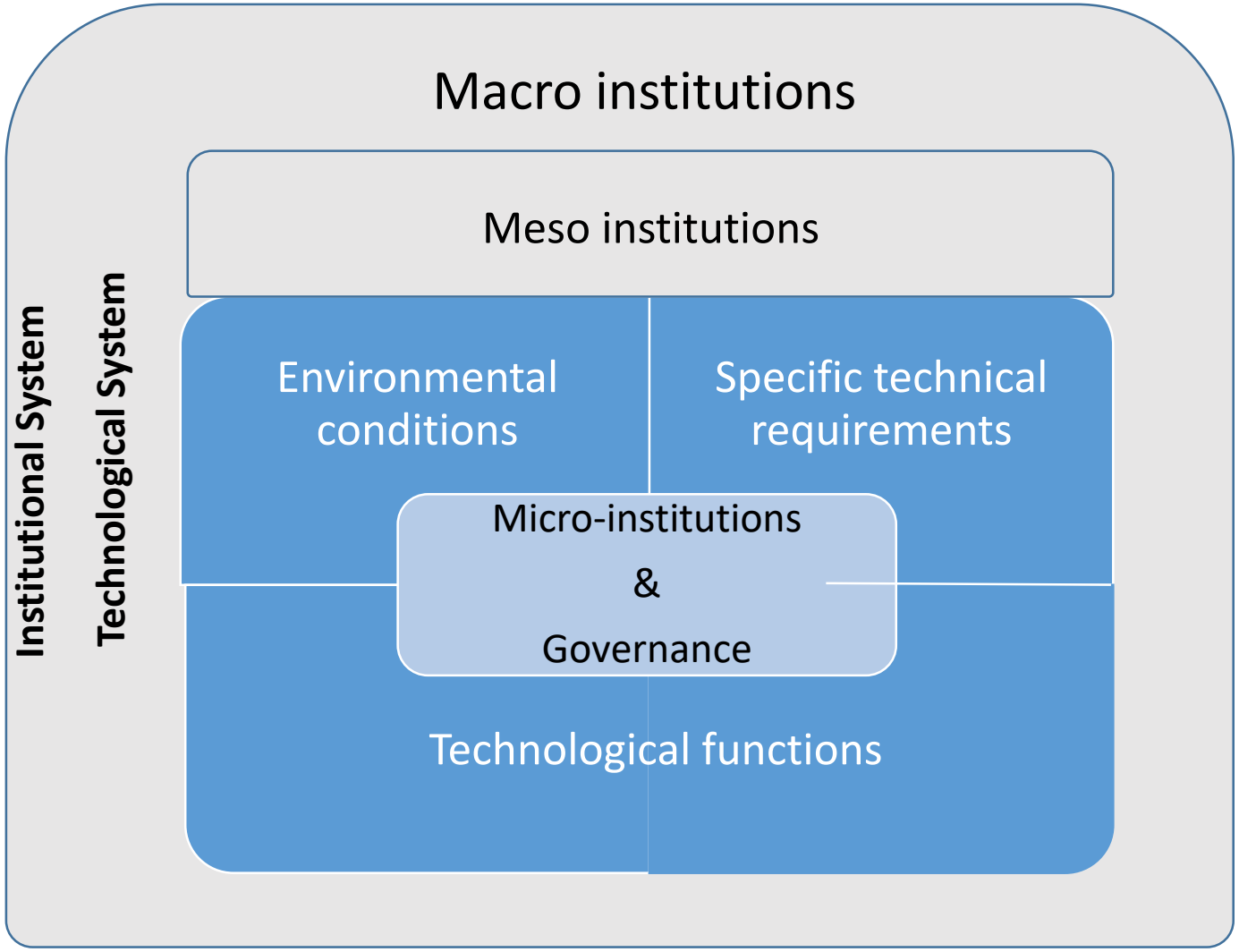
They:

- Benefit from natural resources

and,

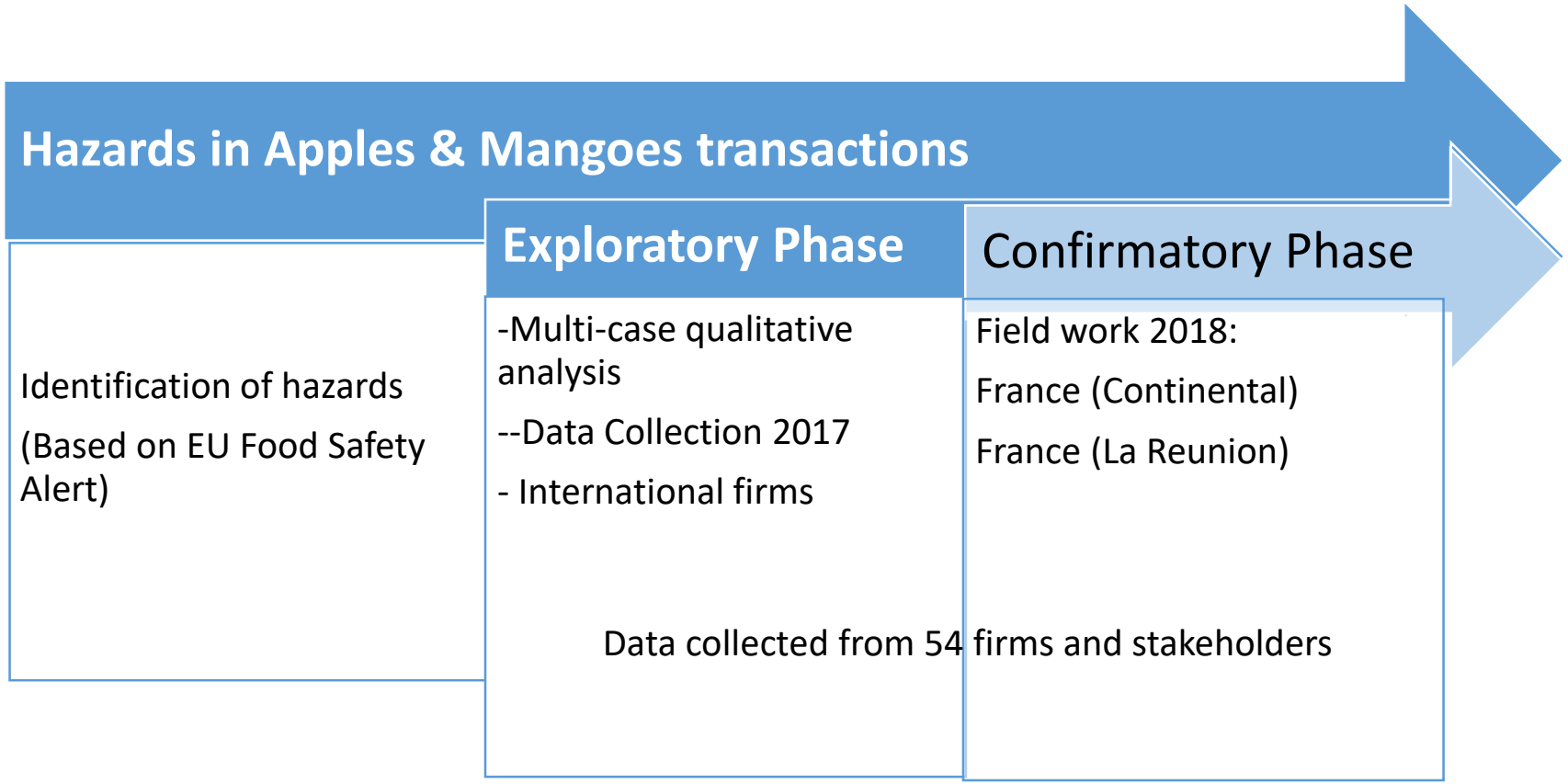
-Supply food, non-food products and services (Le Roux et al., 2008).

- Agriculture supply chains are social-ecological systems interacting within natural, social, economic, institutional and technological dimensions (Moraine et al., 2015).



(Based on Menard, 2017)

Methodological strategy:



Findings:

To the question:

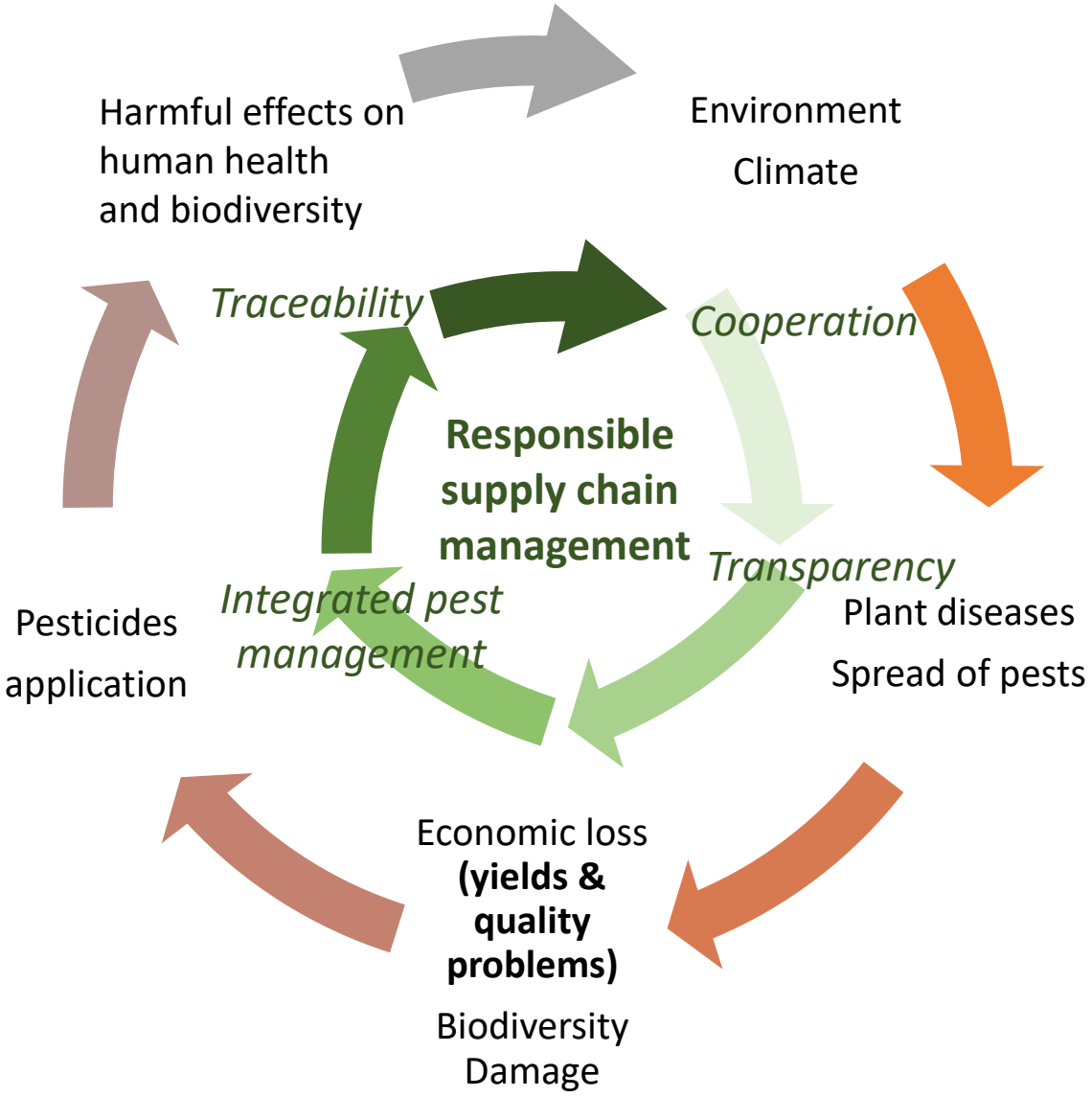
- What factors are source of variability and heterogeneity?

Interviewees answered:

Variability and heterogeneity mainly arise because of:

Climate, varieties, choice of crop management

Beside organoleptic aspects, sanitary hazards are also source of variability and heterogeneity



…Findings

- Managing of variability and heterogeneity

Grower - first processor stage,

- Official/private standards and private agreements:
  - To measure
    - Physical/chemical characteristics (e.g. size, brix)
    - Organoleptic characteristics (eg. color, texture)
  - To fix limits and tolerances:
    - Level of pathogens (toxins)
    - Contaminants (pesticide residues, heavy metals, radioactivity)
  - Other: varietal mix, origin of food materials
  - Parameters → from generic to customer-specific

First processor stage,

- The homogenization and standardization of the industrial product
- The valorization of the heterogeneity as means of differentiation

Institutional linkages

Macro-institutions

WTO rules
- Technical regulations, standards, testing and certification procedures.
- SPS measures

European Union
Ministries (Agriculture, Economy and Health)
- Food law
- Marketing standards

Meso-institutions

Departmental government
Research organizations

Growers associations (e.g. Association Producteurs Pomme-Poire) → Collective Eco-friendly Label
Industrial associations → Fruit Juice Association Code

Micro-institutions

Consumer/customer demands translates into product specifications (Industrials, Distribution, Consumers)

Contracts: Commercial terms
Quality provisions
Quality design
Quality control
Quality improvement
Technological functions (decisions on production)

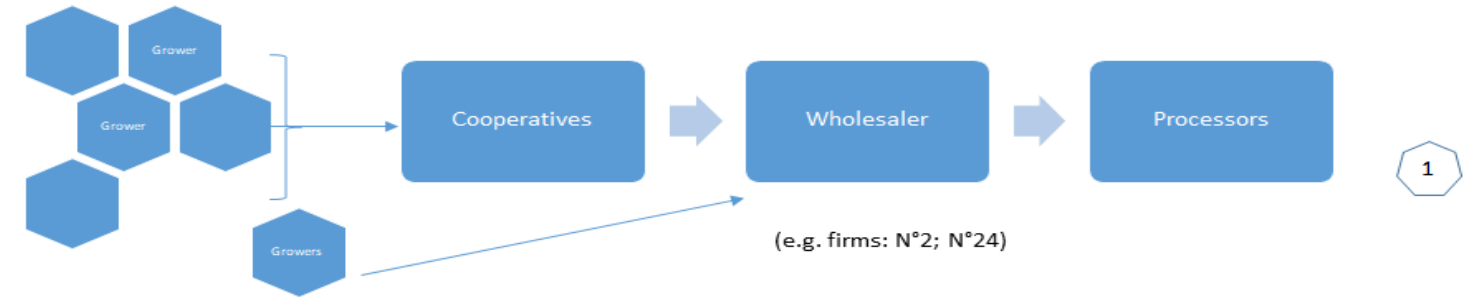
Supply of Food materials → Processing → Product properties

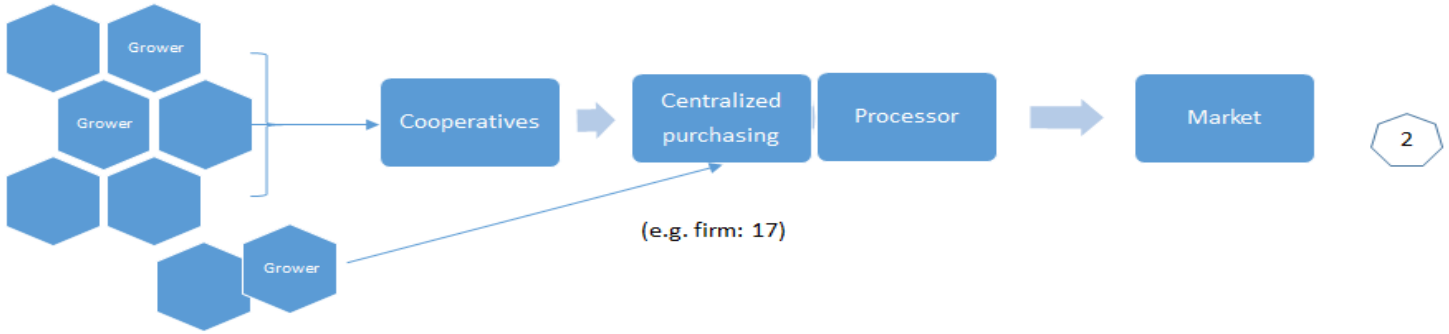
Enforcement
Legal:
Inspections
Courts
Arbitration

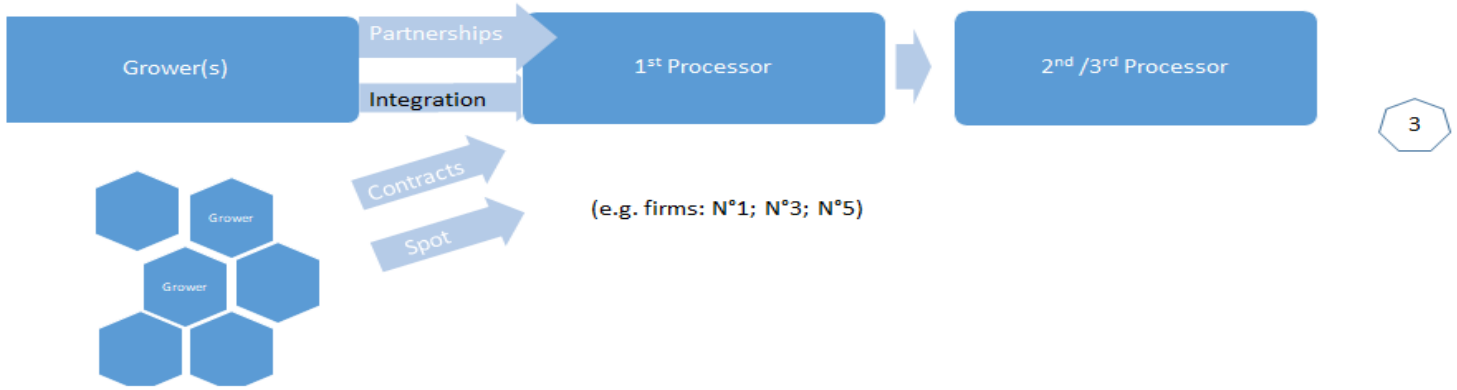
Informal:
Firm reputation

Based on Menard (2017); Luning & Marcelis (2007)

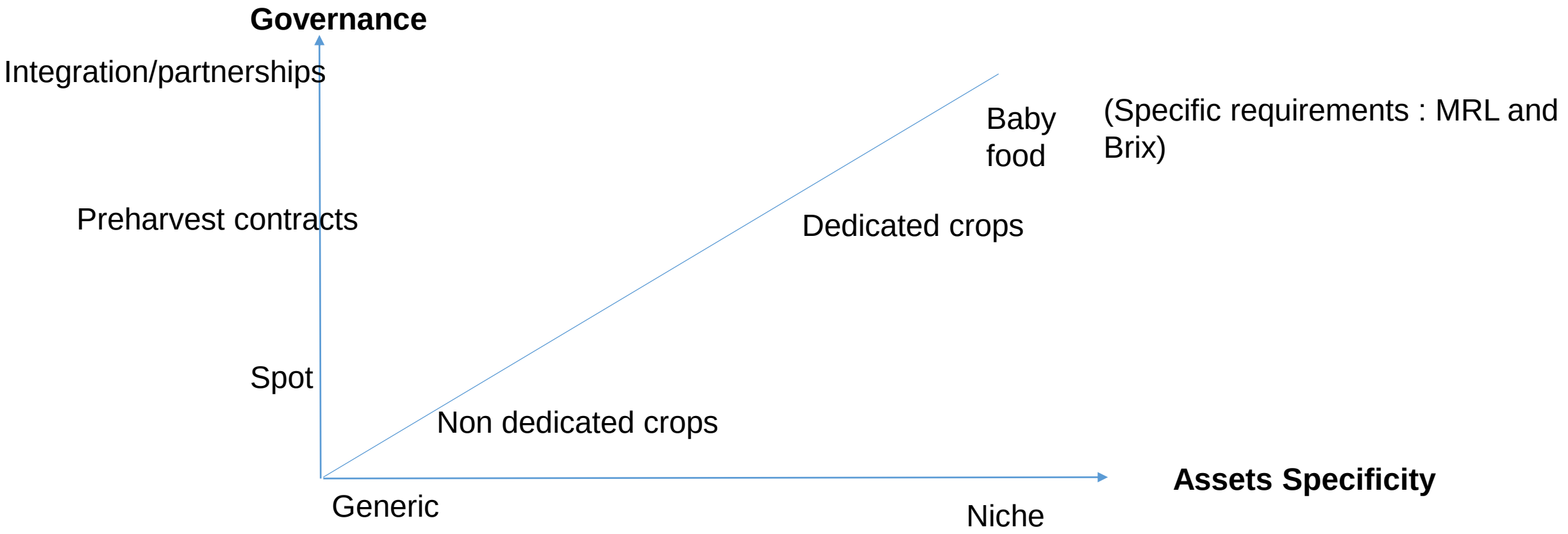
Supply chain configurations







Governance



- Supply chains of apples and mangoes are mostly oriented to the fresh market (mostly non processing dedicated crops)

Conclusion:

Variability and heterogeneity:

- Intrinsic characteristics of agricultural products and strongly linked with food quality.
- Increase in transaction costs (e.g. measurement).

- Coordination of actors within the supply chains through:
  - Multilayer institutions influencing technological decisions (e.g. Mesolevel: label for responsible supply chain management e.g. *Vergers écoresponsables*)
  - Homogeneization and standardization of the industrial product (predominant strategy)
  - Valorization of the heterogeneity as means of differentiation
- As specific investments increase transactions are governed by tighter forms of governance.

Thank you for your attention