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Paddock to Plate – Supply Chain Efficiencies to Reduce Food Losses

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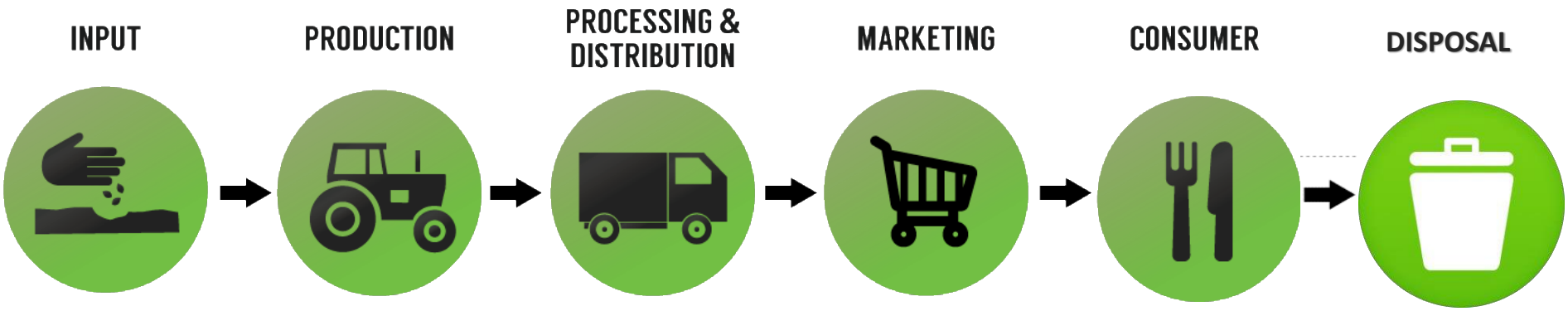
The Global Food Waste Issue

- 1/3 of food produced for human consumption is lost or wasted (FAO, 2011)
- If considered a country, 3rd highest GHG emitter after U.S & China (FAO, 2013)
- 900 M people go hungry while 1 bn overeat (FAO, 2009)

Australian Food Waste

- What do we know so far?
  - Ag. Production: $3 billion per year. (Lapidge, 2015)
  - Household food waste: $ 10 billion per year (NSW EPA, 2011)
  - Commercial & Industrial stream : $10.5 billion per year
- What about the rest of the food supply chain?

We lose up to 90% of our nutrients between soil and sea



(Lapidge, 2016)

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Case Example

Indonesian Potatoes

Potato Industry Case Study - Indonesia

- Planting area : 64,151 ha/year
- Productivity : 1670 ton/ha
- Production : 1,071,543 ton/year
- Consumption/year : 4.2 kg

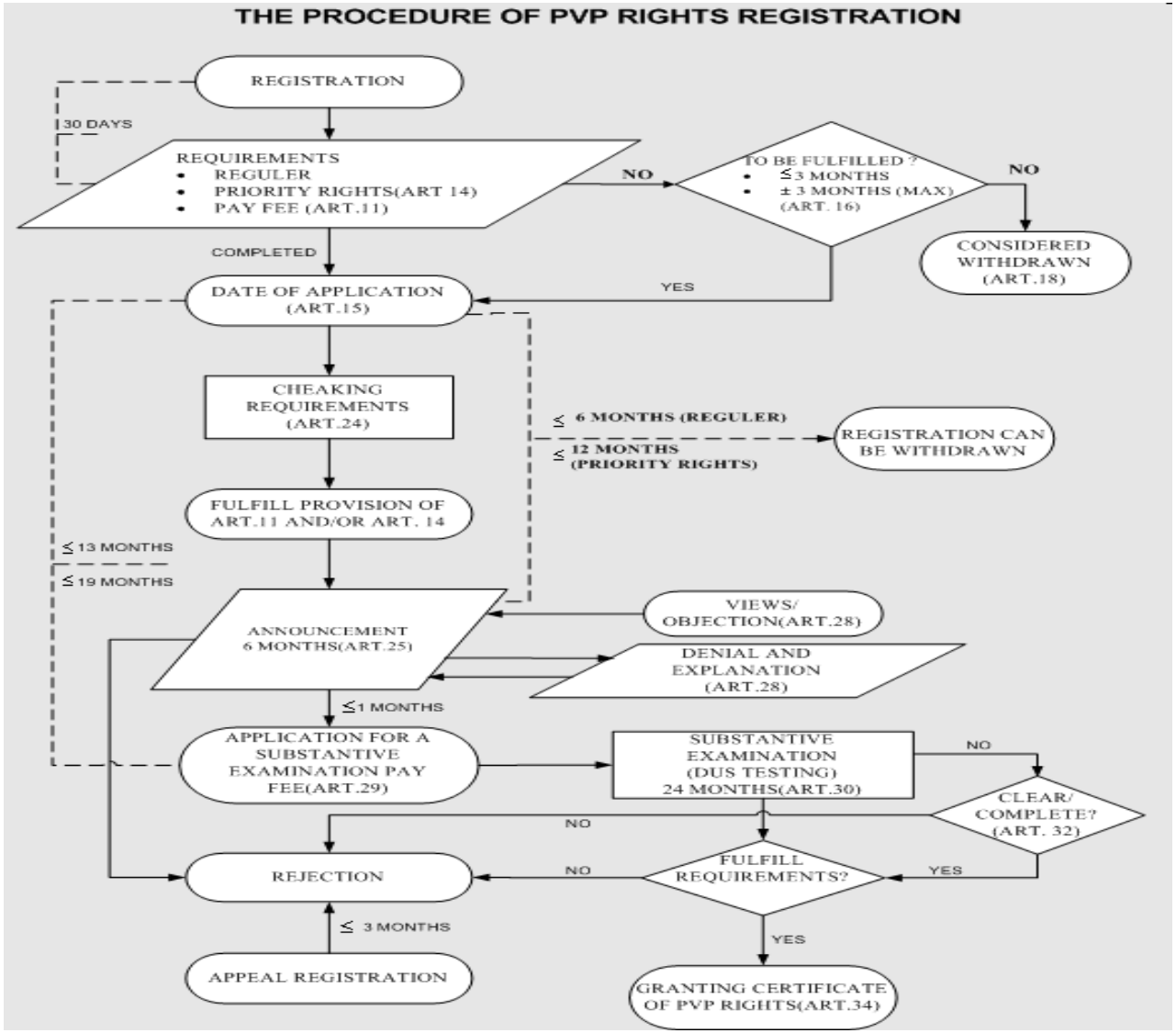
- Potatoes mostly grown on mountainous area/hilly (>1.000 m above sea level, temperature 15-20 degree Celcius)

- Three Types of Potatoes :
  1. For vegetable : var. Granola (self sufficiency)
  2. For Chips : var. Atlantic (partly still imported)
  3. For French fries : Mc russet, Russet burbank

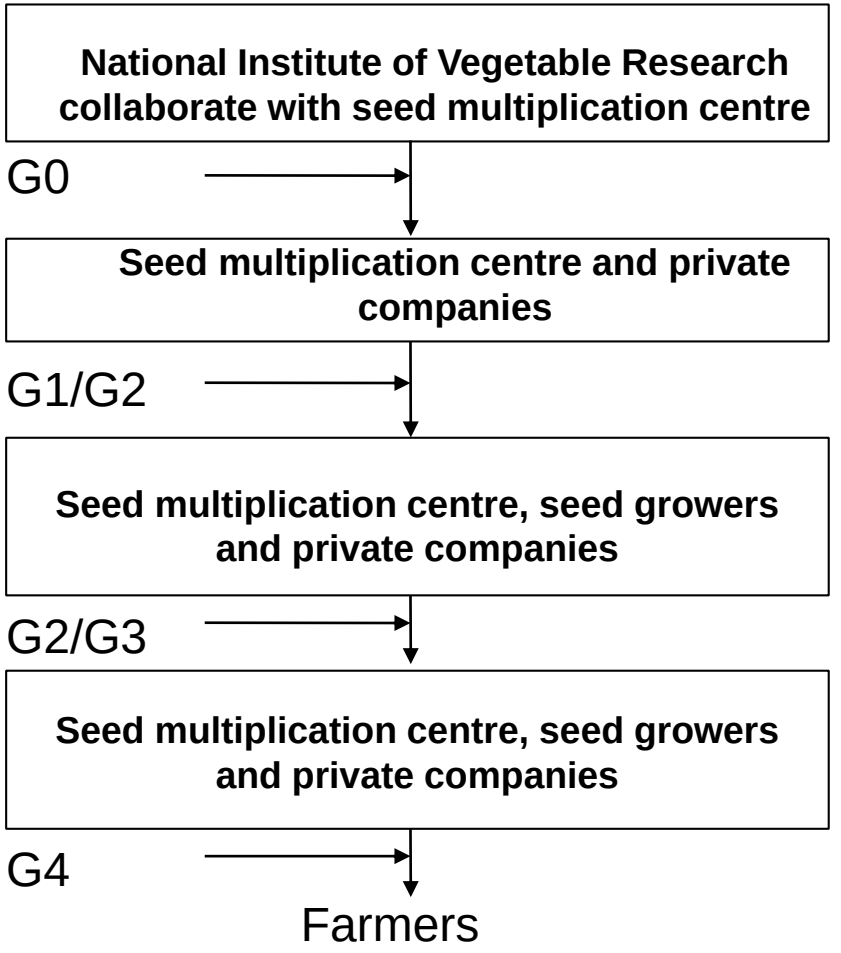
Potato Varieties in Indonesia

1. Cipanas
2. Cosima
3. Granola L
4. Segunung
5. Merbabu – 17
6. Granola Kembang
7. Tenggo
8. Erika
9. Fries
10. Atlantik Mallang
11. Manohara
12. Amudra
13. Dawmor
14. Krespo
15. Balsa

Plant Breeder Rights - Indonesia



Seed Production and its Distribution



Potatoes in Practice

- Since 1980s Granola is Indonesia's main potato variety (80 to 85% of the potato area)
- Late blight and bacterial wilt most significant diseases, followed by viruses
- Potato viruses widespread in major potato areas (West Java, Central Java, North Sumatra, East Java, and West Sumatra)
- More virus disease in areas where quality seed is difficult to obtain / too expensive

Potatoes in Practice – The Seed Challenge

- Seed most costly component of potato production
- Profitability often depends on access to quality seed
- Seed accounts for 10-20% of the total production costs (Fuglie et al. 2005)
- High quality seed too expensive for most farmers, so most use seed tubers saved from previous crop
- Farmers will buy seed tubers when their own seed stock has degenerated due to disease
- G3-G7 is the common generation of potato seed used by farmers

Indonesian Imports

Potato Seed Imports			
Year	**Partner**	**Netweight (kg)**	**Trade Value (US$)**
2012	World	1,862,450	$2,152,145
2013	World	1,767,100	$1,854,764
2014	World	2,084,450	$2,048,782
2015	World	1,735,500	$1,451,591
2016	World	3,037,042	$2,526,235

Fresh Potato Imports			
Year	**Partner**	**Netweight (kg)**	**Trade Value (US$)**
2012	World	46,587,879	$28,667,627
2013	World	55,173,621	$32,619,739
2014	World	40,007,489	$21,757,347
2015	World	38,035,600	$17,782,089
2016	World	39,067,579	$16,195,264

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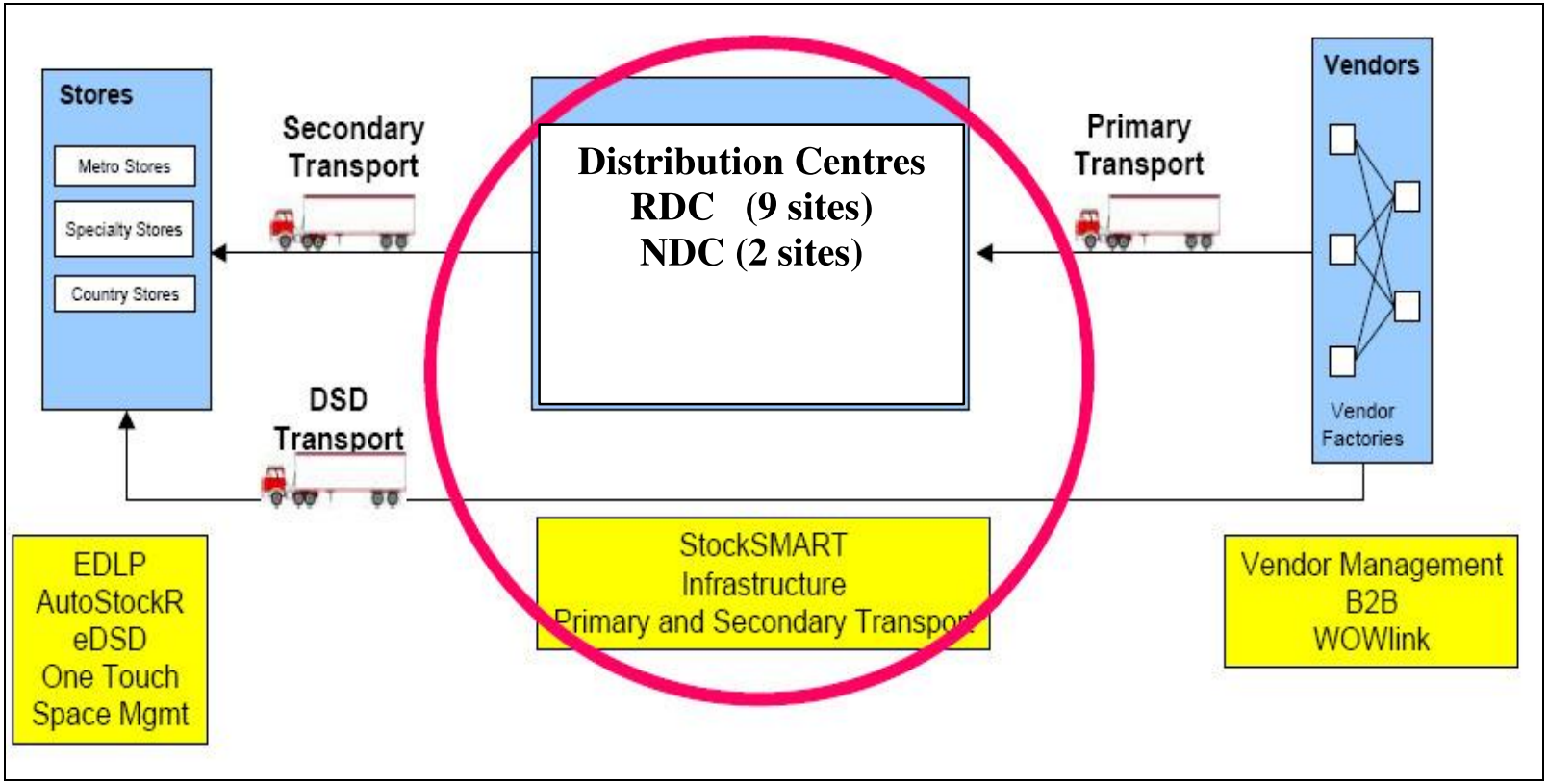
Case Example

Supply Chains

Domestic Supply Chain Inefficiencies

- In early 2000's Woolworths reduced and merged its distribution centres from 31 to 9 regional distribution centres (RDC) and managed 2 national distribution centres (NDC)
- Primary production in remote areas now distributing to
- Centrally located distribution centers
- Greater cost advantages to retailer
- Lower cost to consumer
- Reduced shelf life of fresh produce
- JIT Production and Supply to meet demand

Woolworths IT based Supply Chain



International Supply Chain Inefficiencies

- Distance from producer to consumer leads to increased food waste
- Freight forwarders channel produce through established ports of export and import
- International freight networks are cost efficient not necessarily time efficient
- Inefficient freight movement leads to greater likelihood of food losses throughout the supply-chain and for the consumer

Australian Trade with BIMP-EAGA

- Northern Territory Government commissioned report into supply chain efficiency
- Identified supply chain improvements across all four regional economies; Brunei Darussalam, Indonesia, Malaysia and Philippines
- Range of products exported from BIMP-EAGA to other Aus. states via alternative ports (Fremantle, Adelaide, Melbourne, Geelong, Sydney, Brisbane, and Cairns):
  - Fish and Crustaceans
  - Fruit and Nuts
  - Vegetables
  - Cereal preparations

Australian Trade with BIMP-EAGA

- Also in the other direction, from alternative Australian Ports to BIMP-EAGA including:
  - Unmilled Grain
  - Animal Feed
  - Vegetables
  - Preserved fruit and vegetables
  - Fruit and Nuts
  - Fresh Meat
  - Live Animals

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What do we do to improve?

Recommendations

Gaining supply chain efficiencies

- Utilise innovative food technology in production inputs for reduced food losses at paddock
  - Policies to reduce restrictions on food innovation
  - Greater IP protections for innovation developers
  - Cost efficiencies in food technology utilisation
  - Education for food producers on benefits of utilisation

- Develop efficient distribution and supply chains
  - Reduce time from paddock to plate
  - Develop distribution infrastructure in regional centers (customs capabilities, ship loading, regional distribution centers)
  - Utilise technology to allow producer to supply end user more efficiently


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Thank you
Any Questions?