COLUMBIA | SIPA
School of International and Public Affairs

# Value Chain Analysis

Carl Cervone
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# My background

- Education: BS in Environmental Science, MBA
- 2004: Moved to Tanzania to work in microfinance

2006: Started work in coffee sector at TechnoServe

- 2016: Cofounded Enveritas
- 2023: Cofounded Kariba (software value chains)

# Coffee: the value chain from farm to cup

$4/kilo

$4/cup

# Coffee: the value chain from farm to cup

~~$4/kilo~~
$4.50/kilo

~~$4/cup~~
$6/cup

# Coffee prices today

# Plan for today

- The Coffee Value Chain
- The Value Chain Framework
- Case Study: Vietnam vs Rwanda
- Q&A

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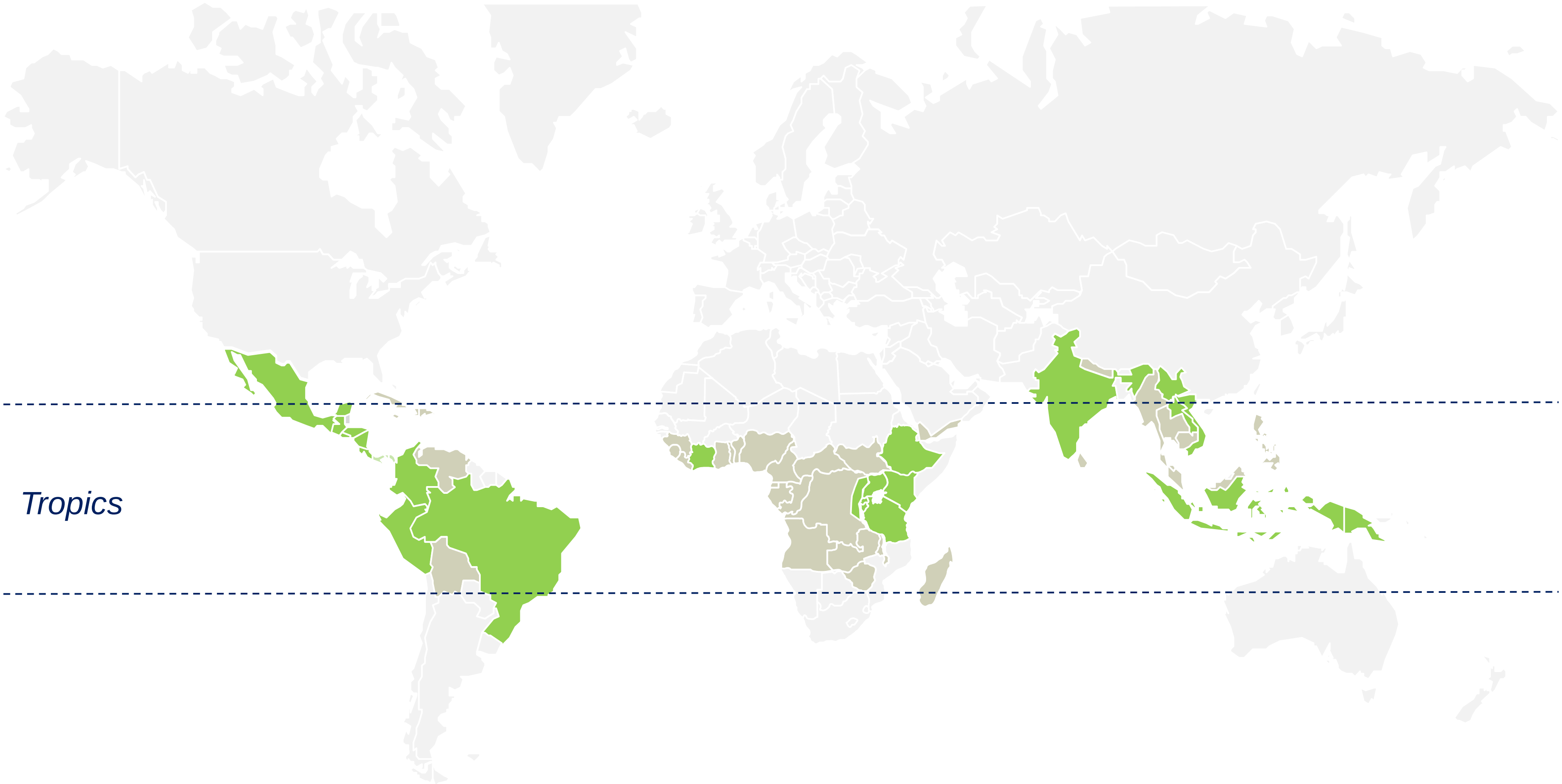
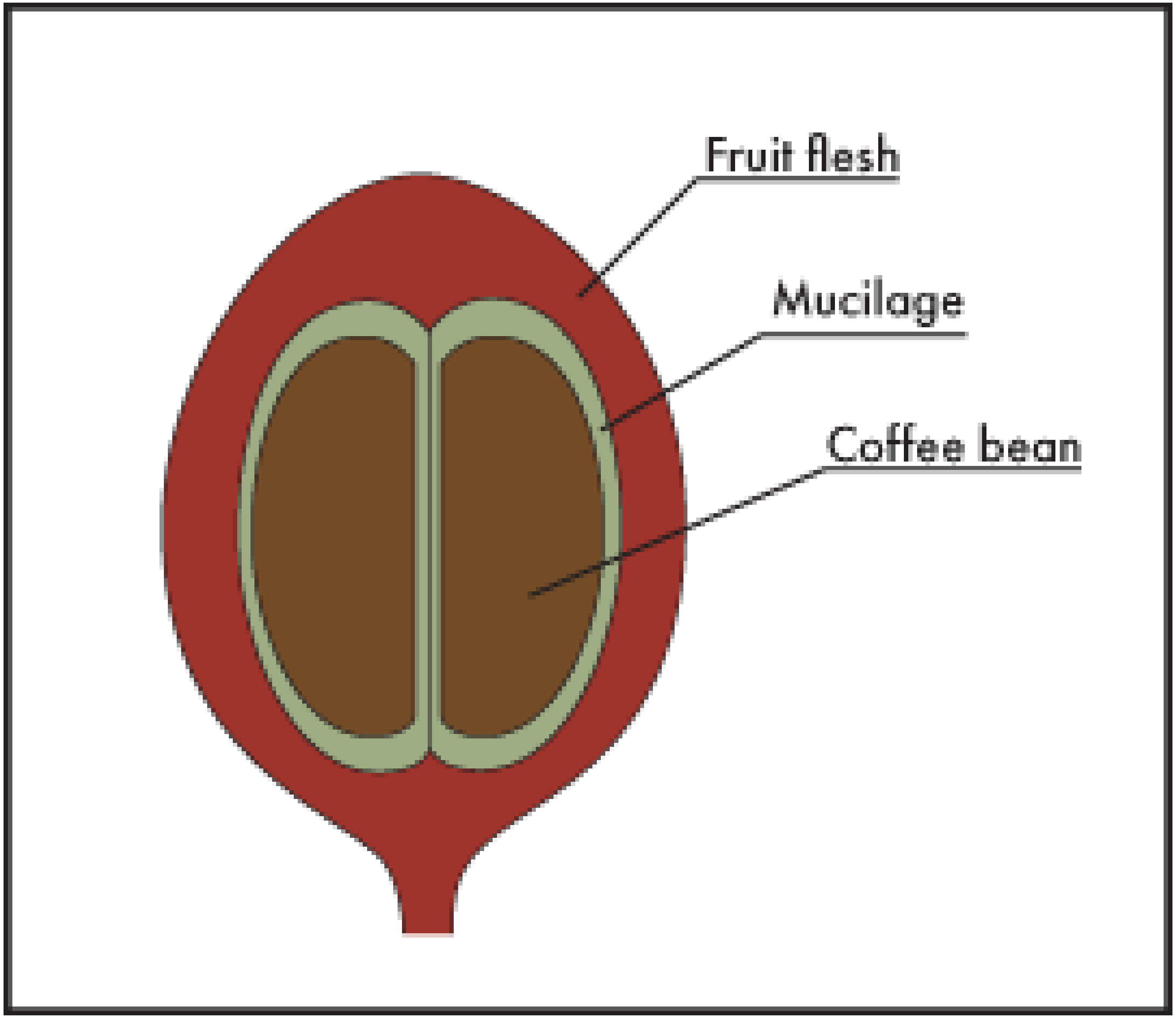
# Coffee is a fruit that grows on trees

# Coffee trees require a tropical climate




- Major producers (~20 countries)
- Minor producers (~30 countries)
- Non-coffee countries

# The coffee “bean” is the seed inside the fruit




Source: http://www.dbmudhouse.coffee/coffee-processing/

# The coffee value chain from cherry to cup

| Cherry | Parchment | Green | Roasted | Ground | Cup |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| | | | | | |

# >95% of the world's coffee farms are **smallholders**

**Cherry**

# There are some very large, industrial coffee farms

**Cherry**

# On small farms, coffee cherries are harvested by hand

**Cherry**

# Coffee should be processed immediately after picking

**Cherry**

# Cherries are de-pulped…

**Parchment**

# … washed …

**Parchment**

Source: https://lisaleo.wordpress.com/2013/09/26/fully-washed-coffee-natural-process-coffee/

# … and dried

**Parchment**

Source: https://www.perfectdailygrind.com/2018/12/processing-101-what-is-wet-washed-coffee-why-is-it-so-popular/

# Large mills process coffee for export

**Green**

# Exportable coffee is bagged and loaded in containers

**Green**

Source: https://coffeecollective.dk/stories/kenya-2012-part-2-kieni-gichathaini-karatu-and-more/

# Coffees are blended and roasted to different profiles

**Roasted**


Source: https://www.sentryair.com/blog/industry-applications/chemical-solvents/diacetyl-hazards-coffee-roasting-industry/

# Coffee is ground, packaged, and vacuum-sealed

**Ground**


Source: http://www.starbucksmelody.com/2014/08/10/free-tall-coffee-phased-out/

# Water is added – and it’s ready to drink!

**Cup**


Source: https://www.coffeedesk.com/blog/what-is-v60-and-how-to-make-drip-coffee/

# Each stage of the value chain involves different actors

| Cherry | Parchment | Green | Roasted | Ground | Cup |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| >10 M farms | <1 M mills | < 0.01 M traders | < 0.1 M roasters | >1 M retailers | >1000 M consumers |
| | | | | | |

# Natural and logistical factors make it difficult to occupy more than 1-2 roles in the overall value chain

| **Cherry** | **Parchment** | **Green** | **Roasted** | **Ground** | **Cup** |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| **>10 M farms** | **<1 M mills** | **< 0.01 M traders** | **< 0.1 M roasters** | **>1 M retailers** | **>1000 M consumers** |
| **Value addition done closer to farm** | | **Value addition done where it's most efficient** | | **Value addition done closer to consumer** | |

# Today, we will focus on the first three stages of the value chain only

| Cherry | Parchment | Green | Roasted | Ground | Cup |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| **>10 M farms** | **<1 M mills** | **< 0.01 M traders** | **< 0.1 M roasters** | **>1 M retailers** | **>1000 M consumers** |
| | | | | | |

# Plan for today

- The Coffee Value Chain
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# Three important steps in any Value Chain Analysis

1 **MAP**

- who the relevant actors are
- what they do
- how they relate to each other

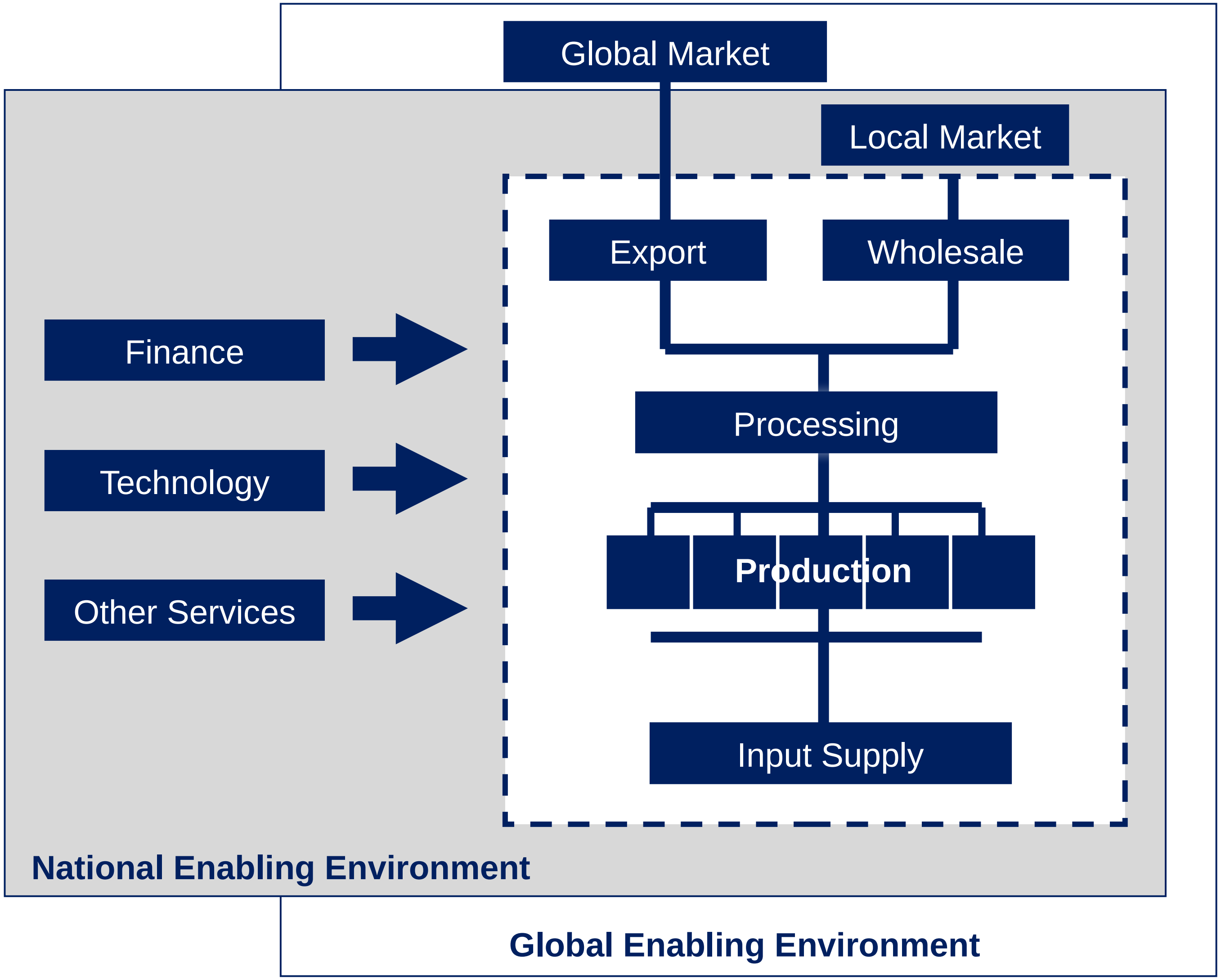
2 **BREAKDOWN**

- costs and revenues for each actor
- how value flows through the chain

3 **BENCHMARK**

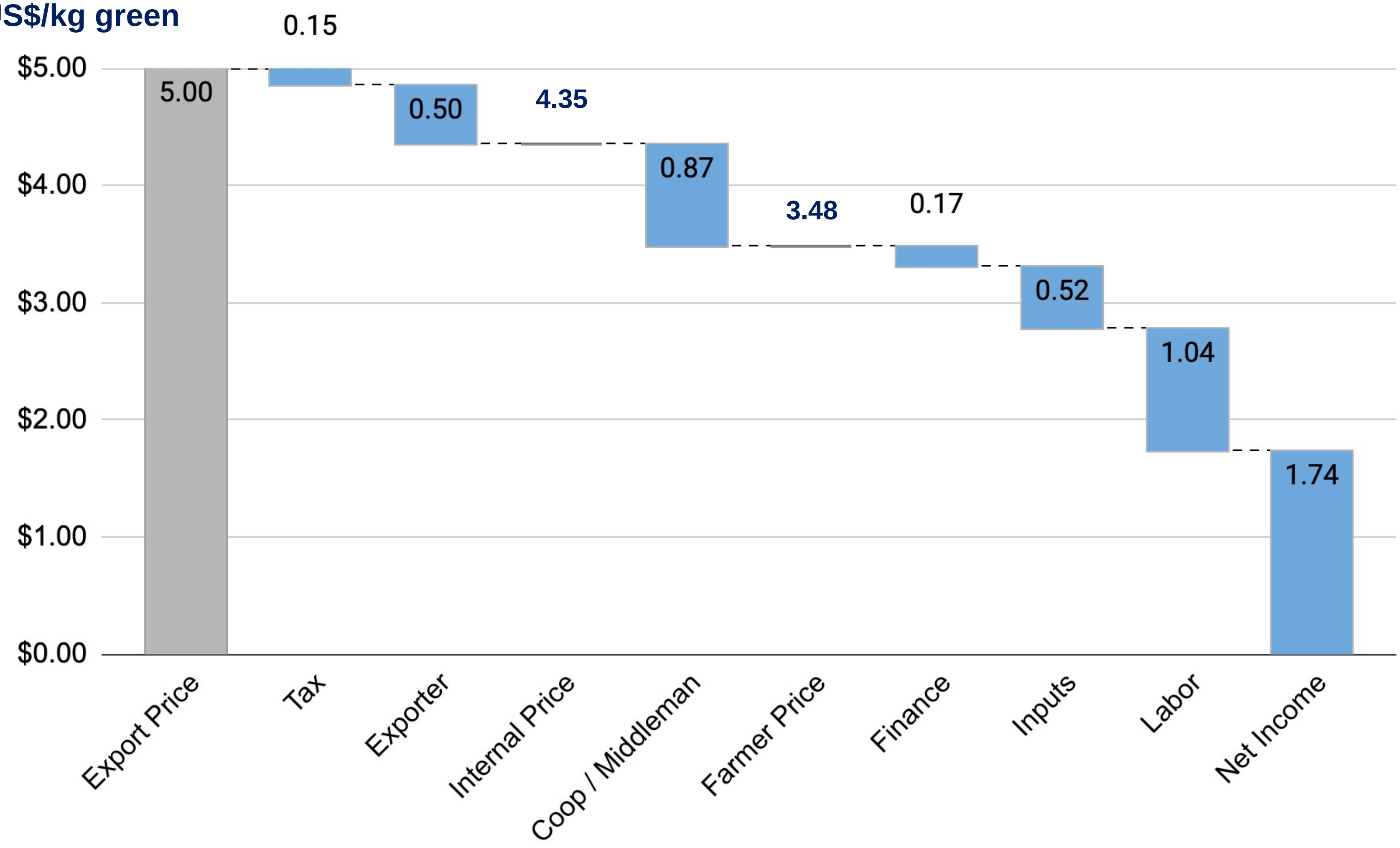
- performance of the value chain against peer countries or sectors
- use data to justify recommendations

# **Map** who the relevant actors are, what they do, how they relate to each other



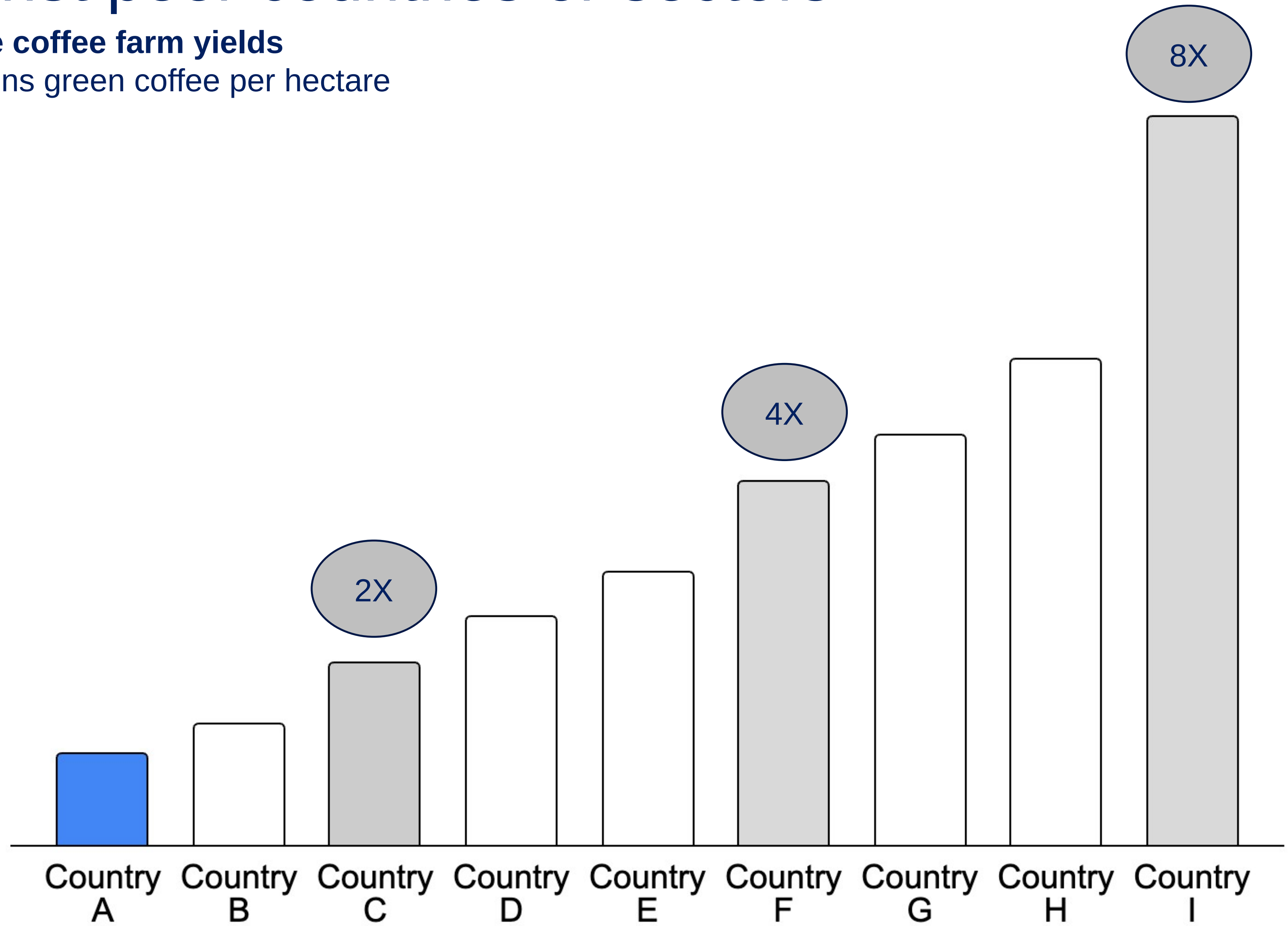
# **Breakdown** costs and revenues for each actor, how value flows through the chain

**Value Flows**
**US$/kg green**

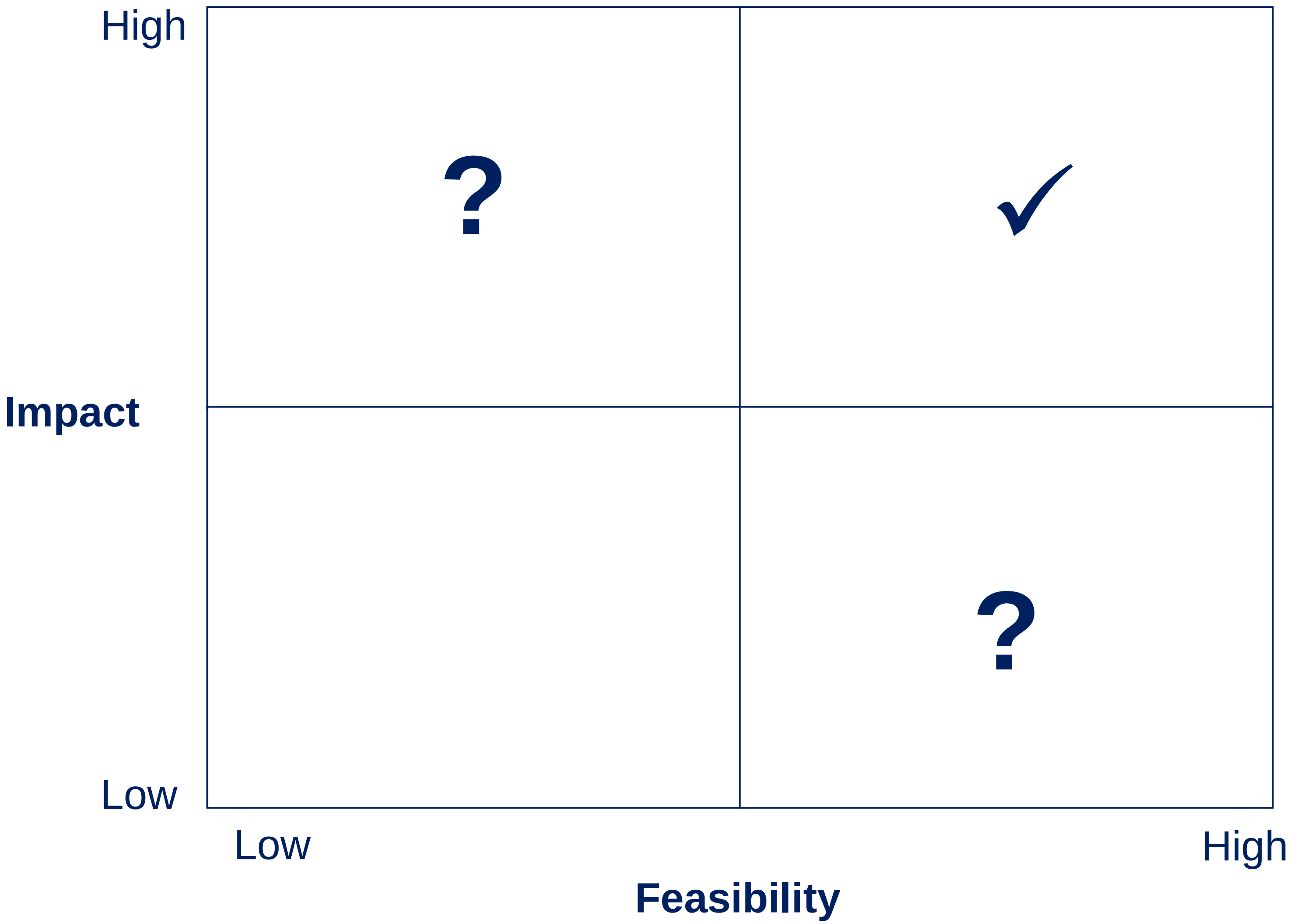


# **Benchmark** performance of the value chain against peer countries or sectors

**Average coffee farm yields**
Metric tons green coffee per hectare



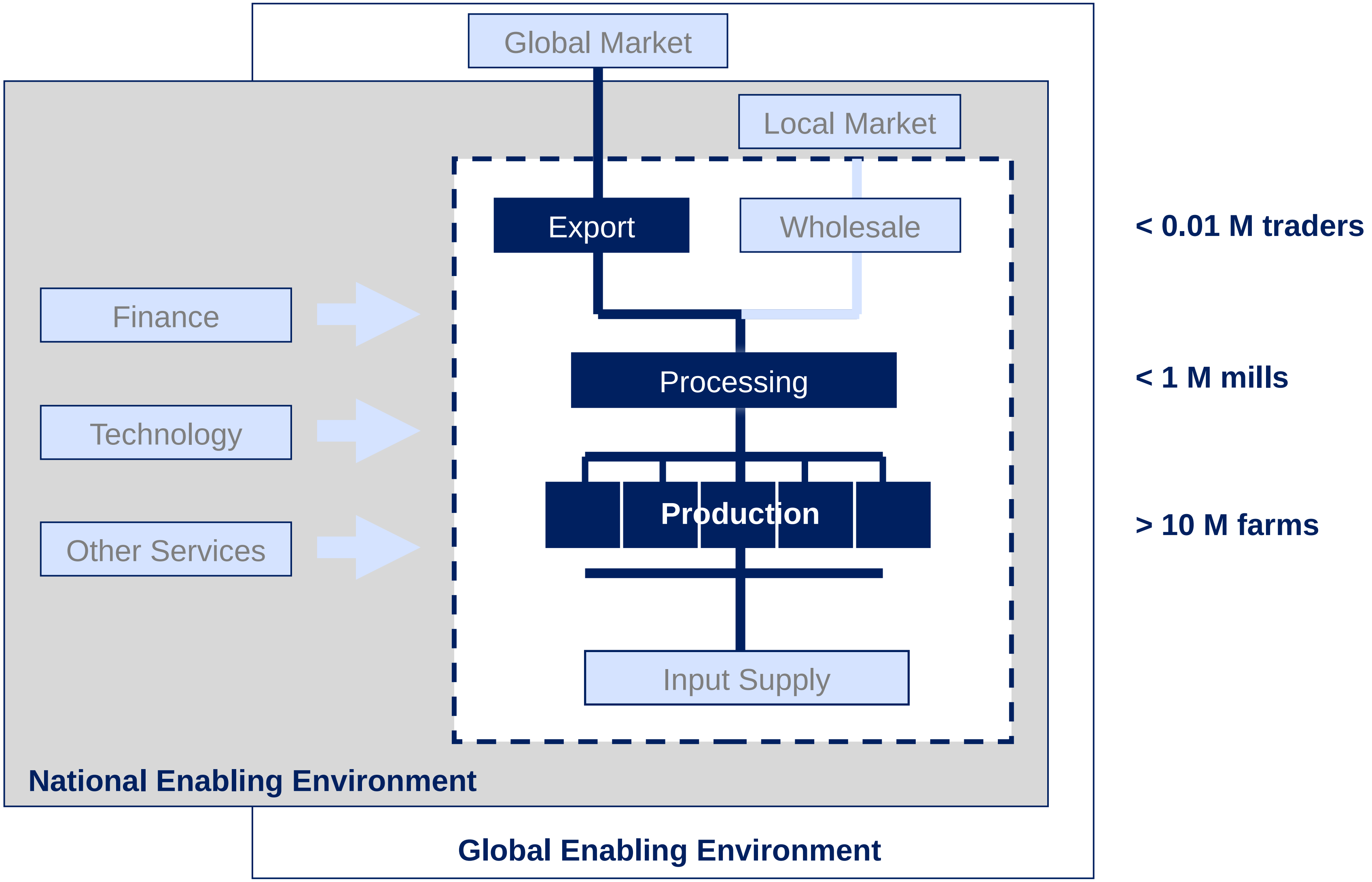
# After analysis, **prioritize** recommendations (based on some predefined selection criteria)



# Applying these concepts to the Coffee Value Chain

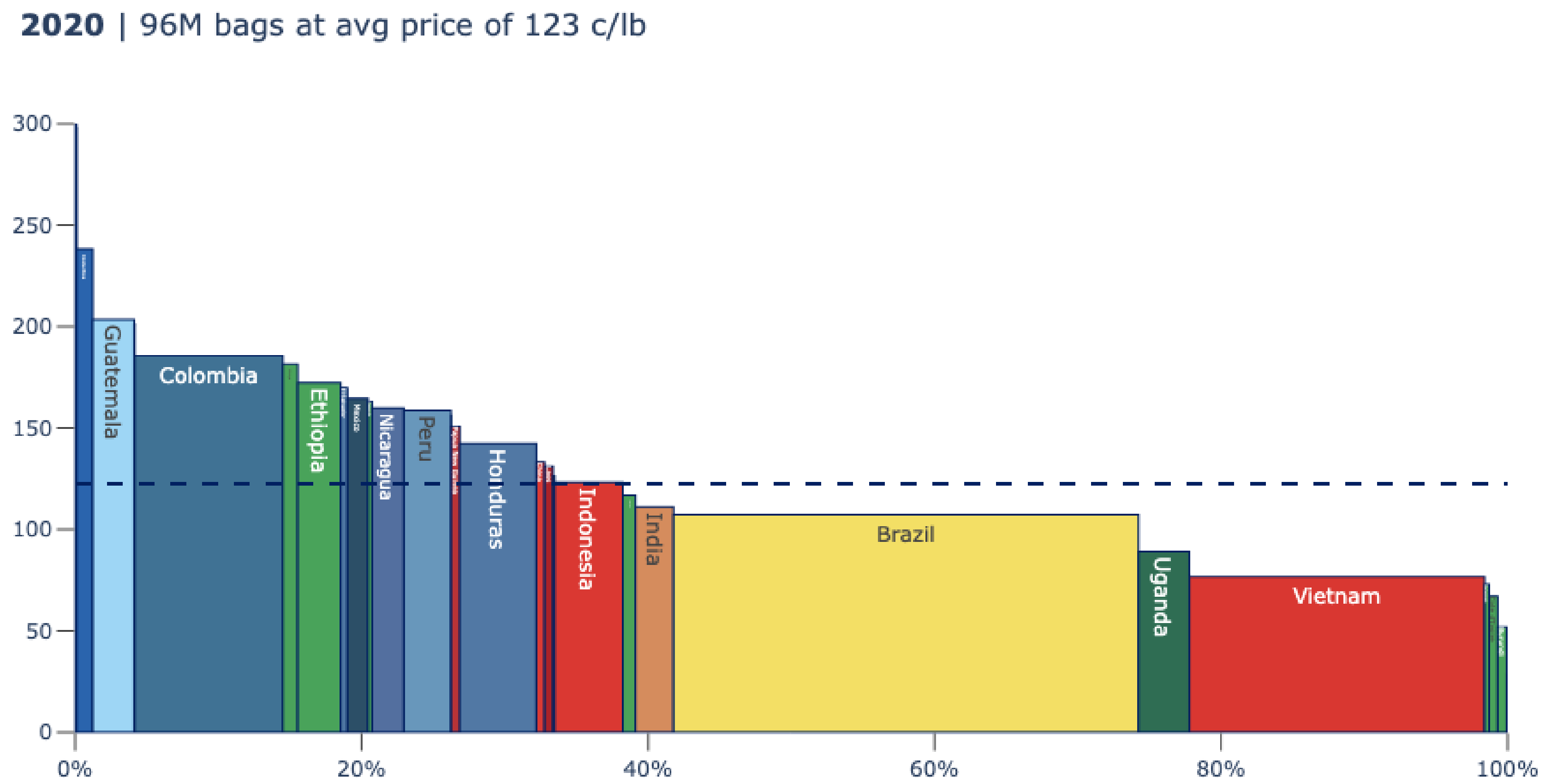
| Cherry | Parchment | Green | Roasted | Ground | Cup |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| >10 M farms | <1 M mills | < 0.01 M traders | < 0.1 M roasters | >1 M retailers | >1000 M consumers |
| | | | | | |

# Global coffee value chain **map**



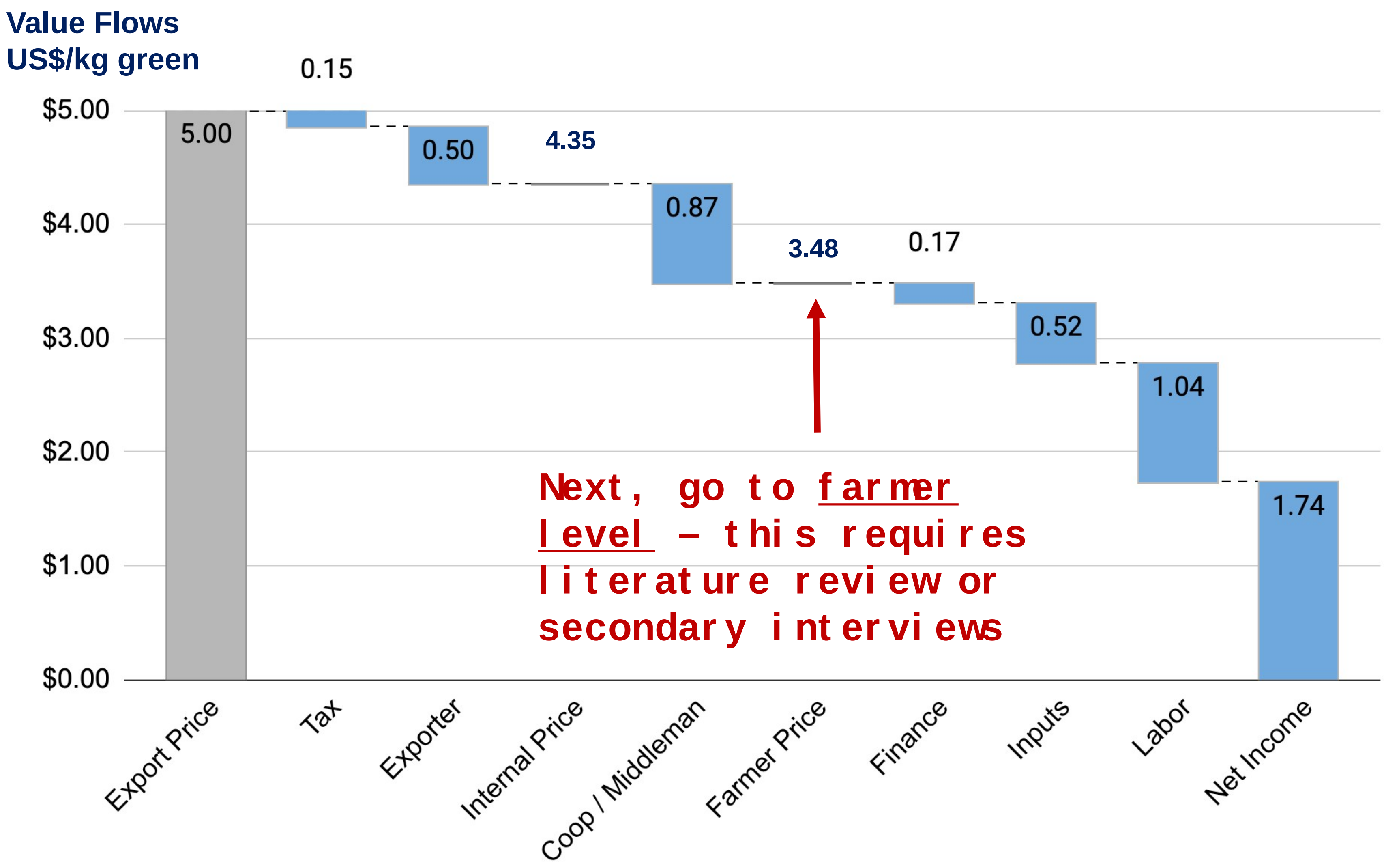
# **Breakdown** costs and revenues for each actor, how value flows through the chain

# Big "commodity" producers tend to receive lower coffee prices




Source: COMTRADE

# **Breakdown** costs and revenues for each actor, how value flows through the chain



# Prices usually require conversions to go from local units to standard international units

**RWANDA EXAMPLE**

**Starting Points:**

- Export price: $2.23 per pound green coffee
- Farmer price: 500 RWF per kilo cherry coffee

**Conversions:**

1. (500 RWF / kg cherry) x (0.00076 USD/RWF) = **$0.38 / kg cherry**
2. ($0.38 / kg cherry) x (0.45 kg / lb) = **$0.17 / lb cherry**
3. ($0.14 / lb cherry) x (7 cherry / green) = **$1.20 / lb green**
4. ($1.20 / lb green farm-gate) / ($2.23 / lb green export) = **54% share**

# Prices usually require conversions to go from local units to standard international units

**RWANDA EXAMPLE**

A Rwandan farmer received 500 RWF per kilo cherry coffee in April 2024. Their coffee was exported for $2.23 per pound green coffee. What percent of the export price did the farmer receive?

To calculate what **percent of the export price** the farmer received, we need to:

1. **Convert cherry coffee to green coffee** (since the farmer is paid per kilo of cherry, but the export is priced per pound of green).
2. **Convert RWF to USD** (to express both prices in the same currency).
3. **Calculate the percentage**.

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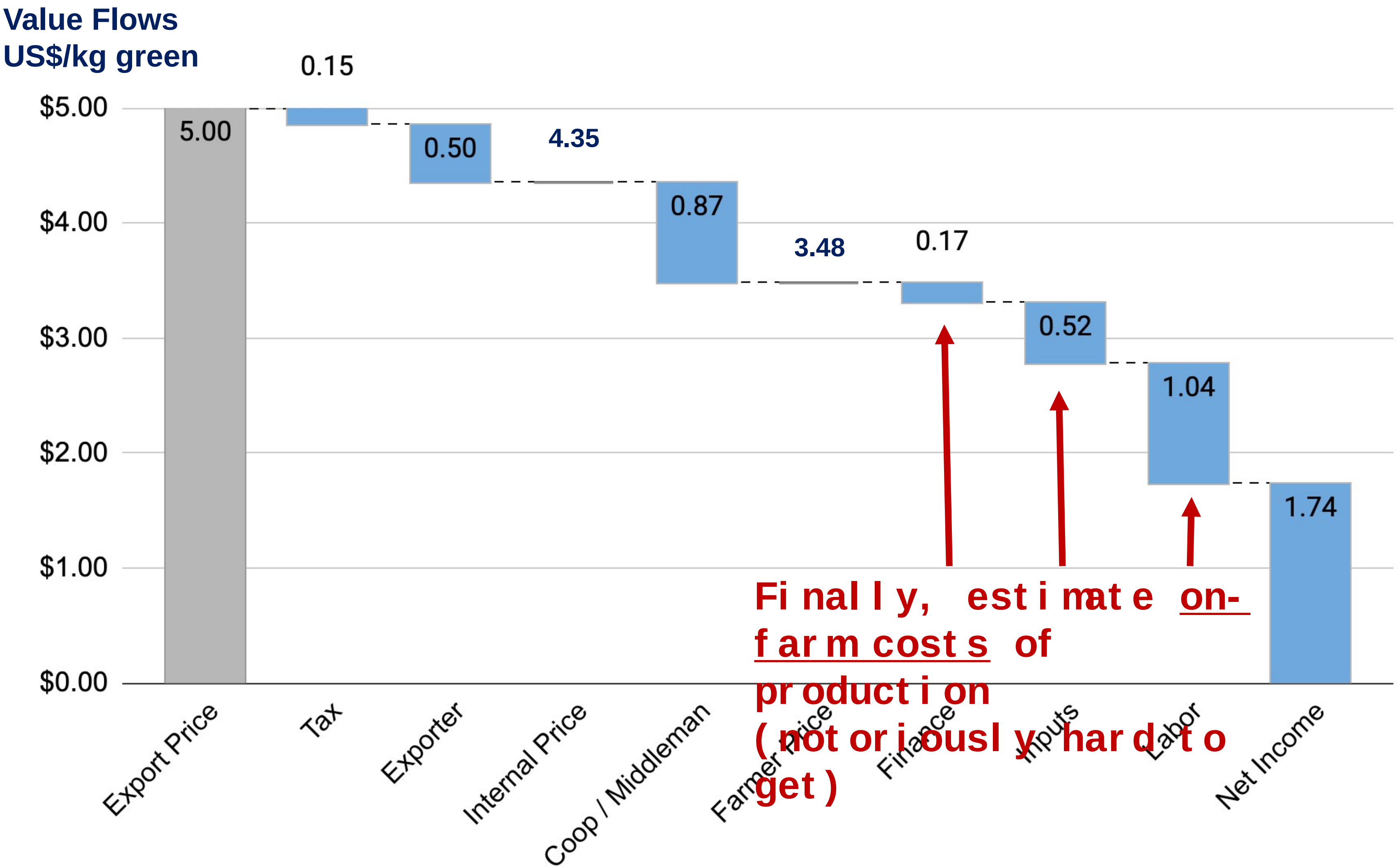
## Final Answer:

**The farmer received approximately 50.5% of the export price.**

# **Breakdown** costs and revenues for each actor, how value flows through the chain

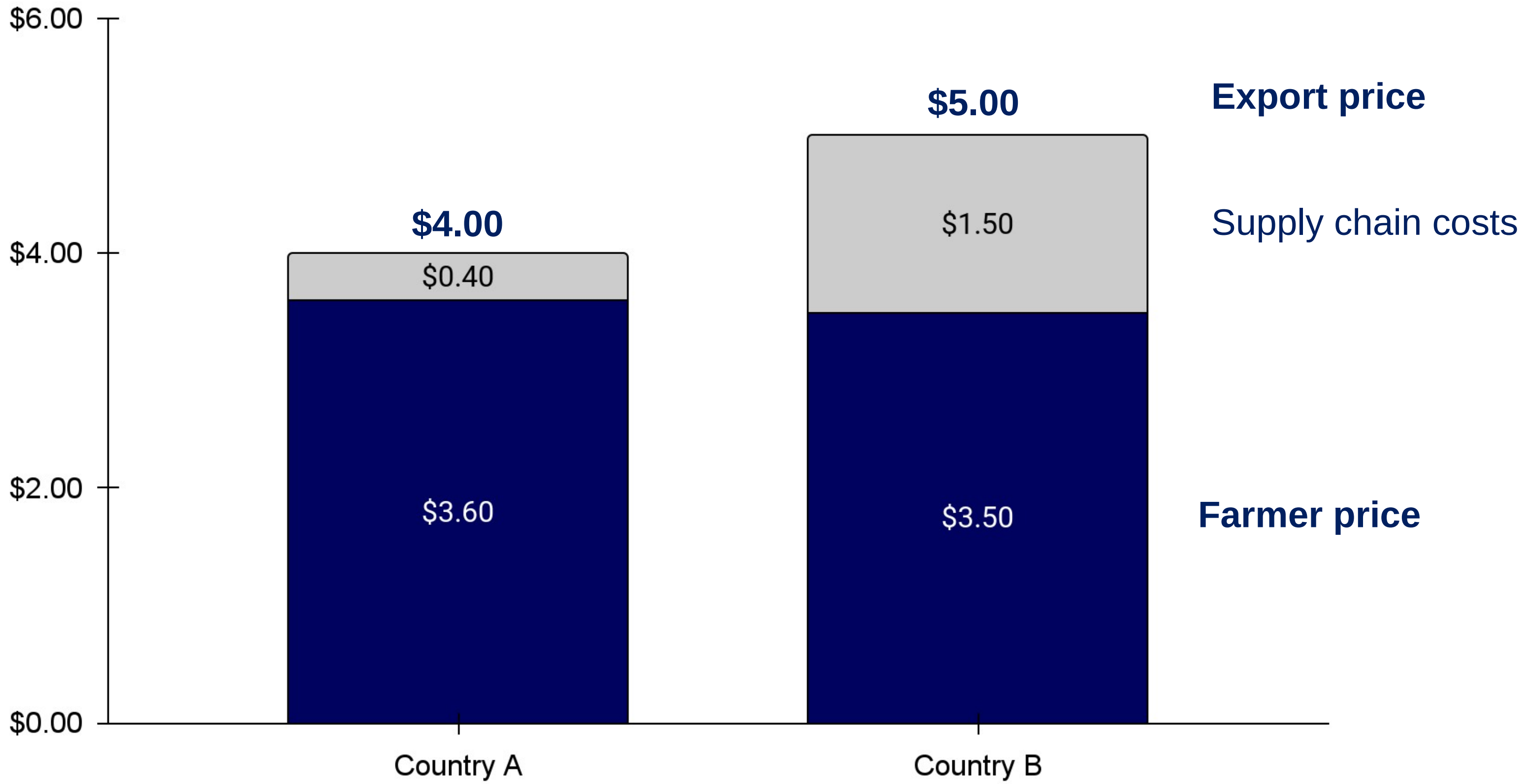
# **Breakdown** costs and revenues for each actor, how value flows through the chain




Finally, estimate <u>on-farm costs</u> of production (notoriously hard to get)

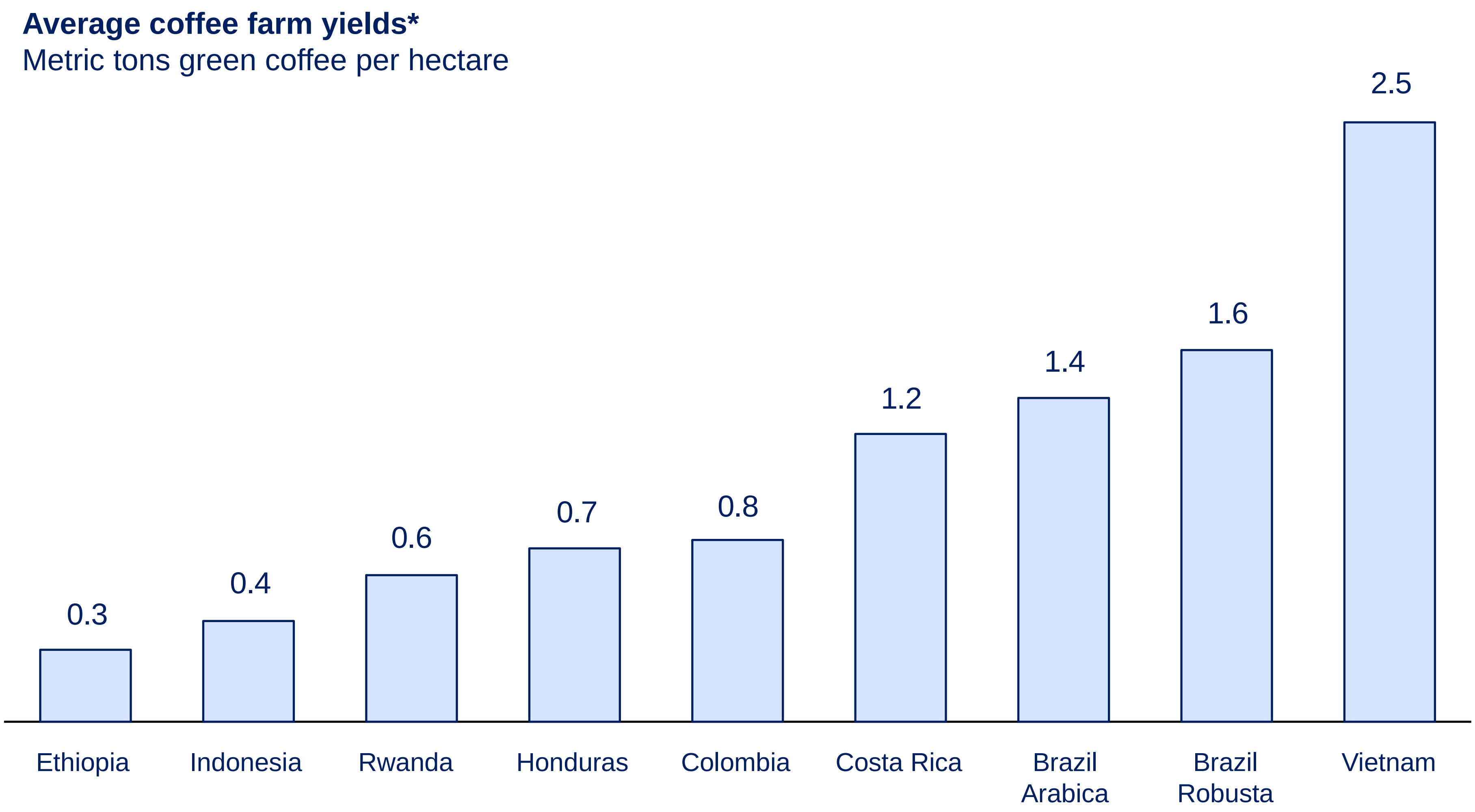
# **Benchmark** performance of the value chain

**Efficiency levels for two illustrative value chains**
US$/kg green




Note: Modeled at 2024/25 coffee crop price of $3.00 per pound

# **Benchmark** performance of the value chain




*National average based on total production (average of last two crops) and area under coffee; includes both Arabica and Robusta unless noted otherwise

Source: USDA; TechnoServe analysis

# Global coffee value chain review

1 **MAP**

- Diverse supply base: 20+ countries, >10 million farms, varying levels of sophistication
- Most coffee sold for export

2 **BREAKDOWN**

- Prices set internationally
- Production costs are influenced by local policies and conditions (e.g., taxes, wages, infrastructure, etc.)

3 **BENCHMARK**

- Lower price countries (Brazil and Vietnam) have higher yields
- Higher price countries (Colombia and Ethiopia) have lower yields

# Recommendations for global coffee value chain

| Impact \ Feasibility | Low | High |
| --- | --- | --- |
| High | Transfer higher share of export price to farmer | Help smallholders improve quality and productivity |
| Low | Export roasted coffee direct to consumers | Boost local coffee consumption |

# Plan for today

- The Coffee Value Chain
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- **Case Study: Vietnam vs Rwanda**
- Q&A

# Coffee in Vietnam

Image from: https://www.grasshopperadventures.com/article/vietnamese-coffee-101/

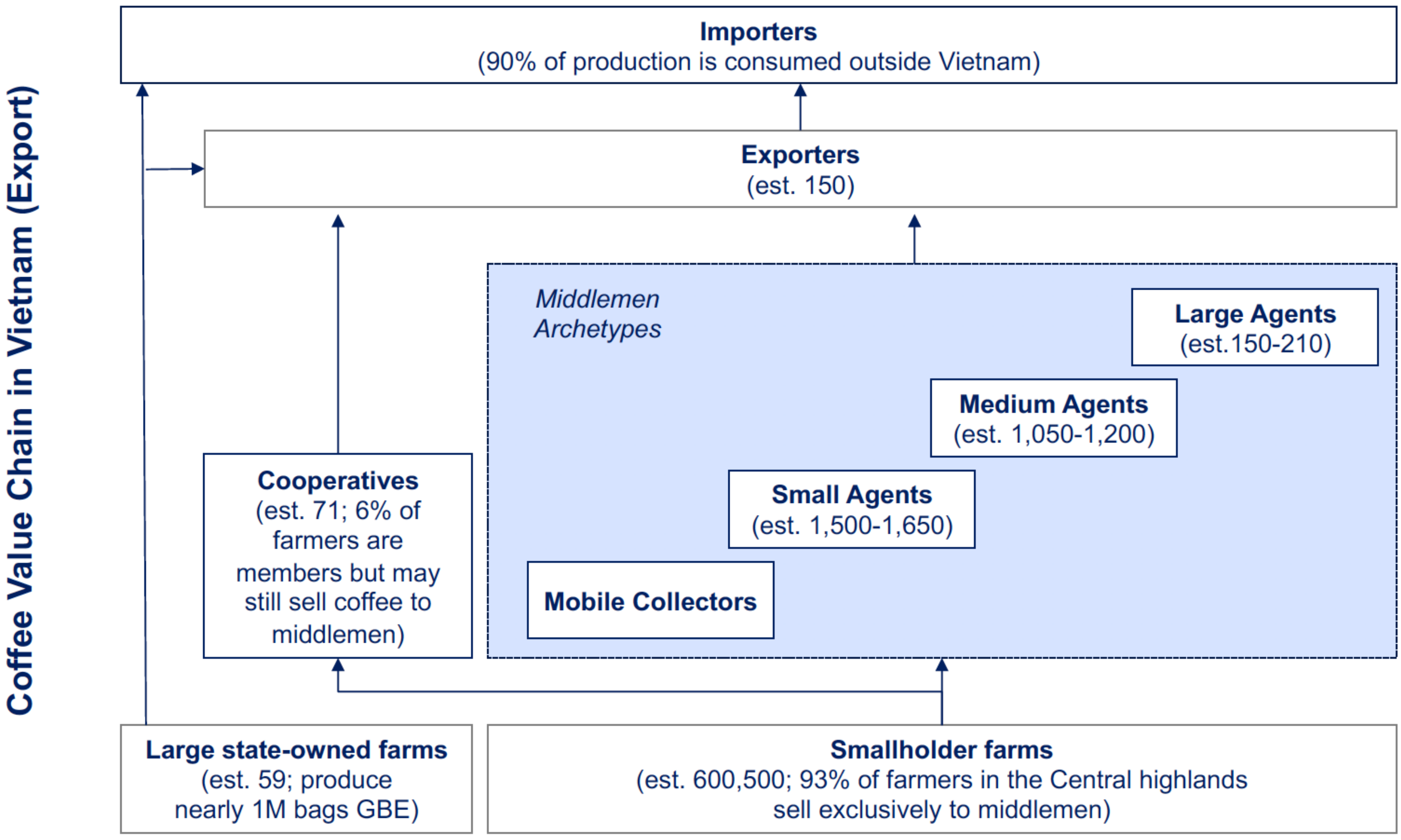
# Coffee in Rwanda

Jacqueline Munezero, Kopakaku Dutegure Coffee Cooperative; Source: One Acre Fund

# Most Vietnamese coffee farms are around 1 hectare in area

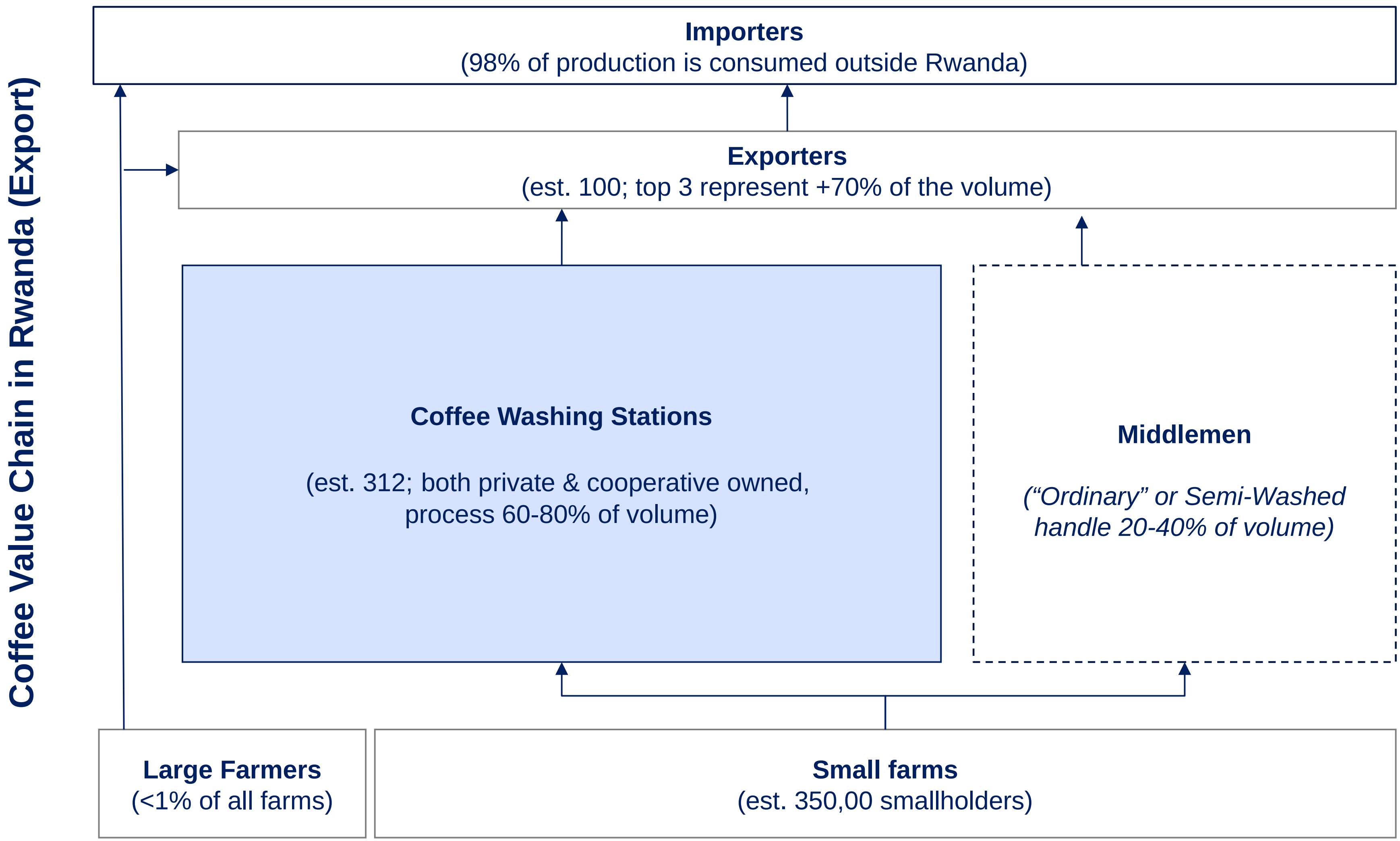
# Most Rwandan coffee farms are smaller than 1 acre

# Vietnam has ~600,000 coffee farmers and a highly competitive "middleman" economy




Source: An analysis of the role of middlemen in coffee supply chains: Vietnam Country Report; prepared by Enveritas in January 2020

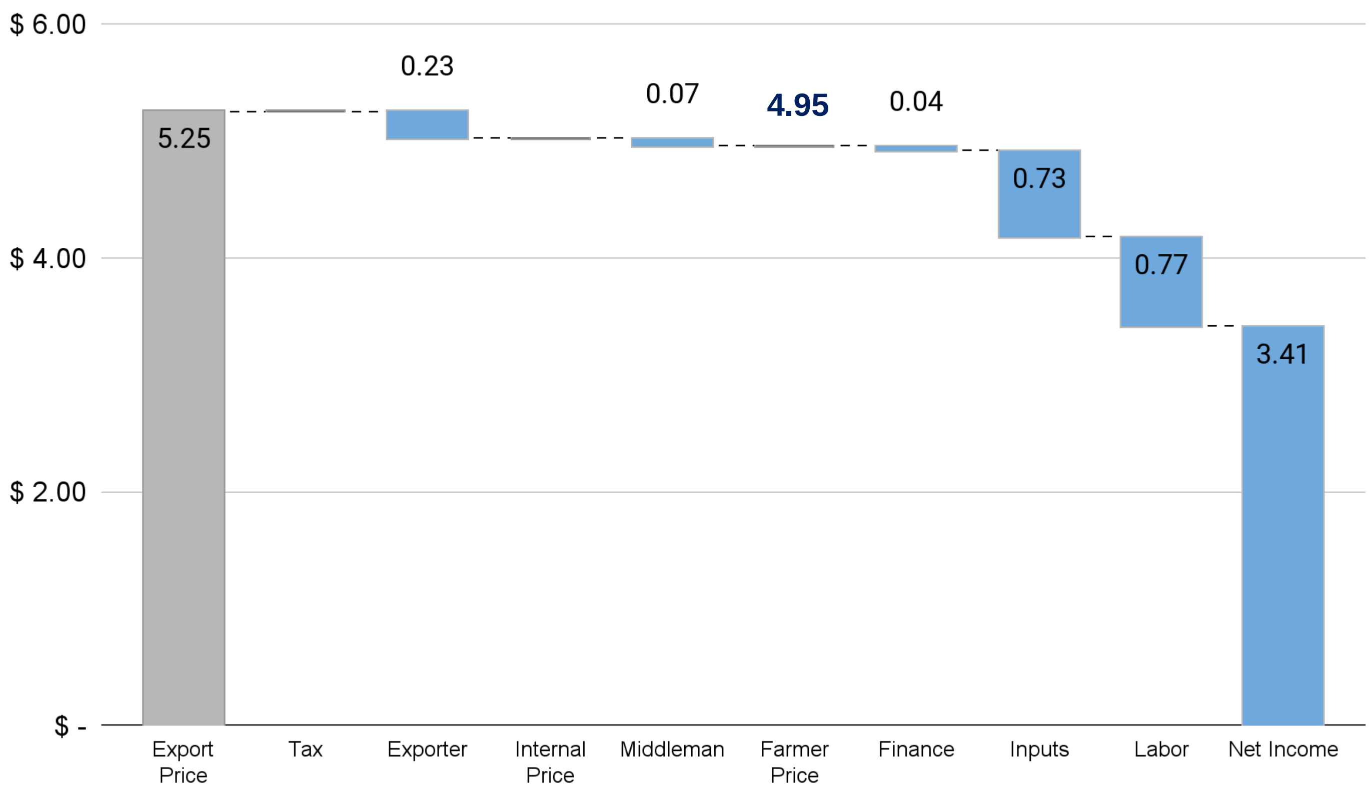
# Rwanda has ~350,000 coffee farmers, transitioning from cooperative led to exporter led




Source: One Acre Fund analysis

# Vietnamese farmers earn >90% of the export price

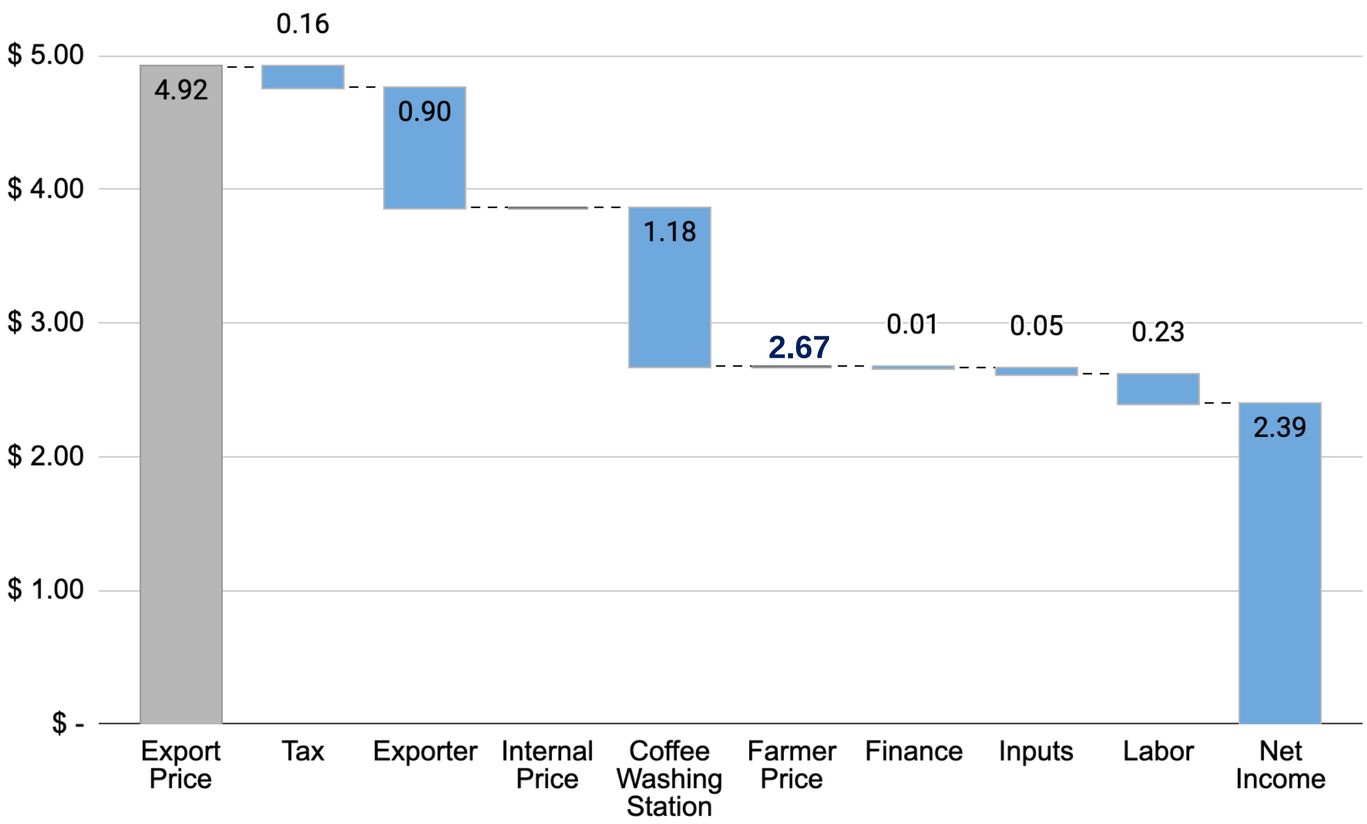
**Illustrative Vietnam Robusta supply chain cost breakdown**
US$/kg green




Source: Author estimates based on current prices (March 2025)

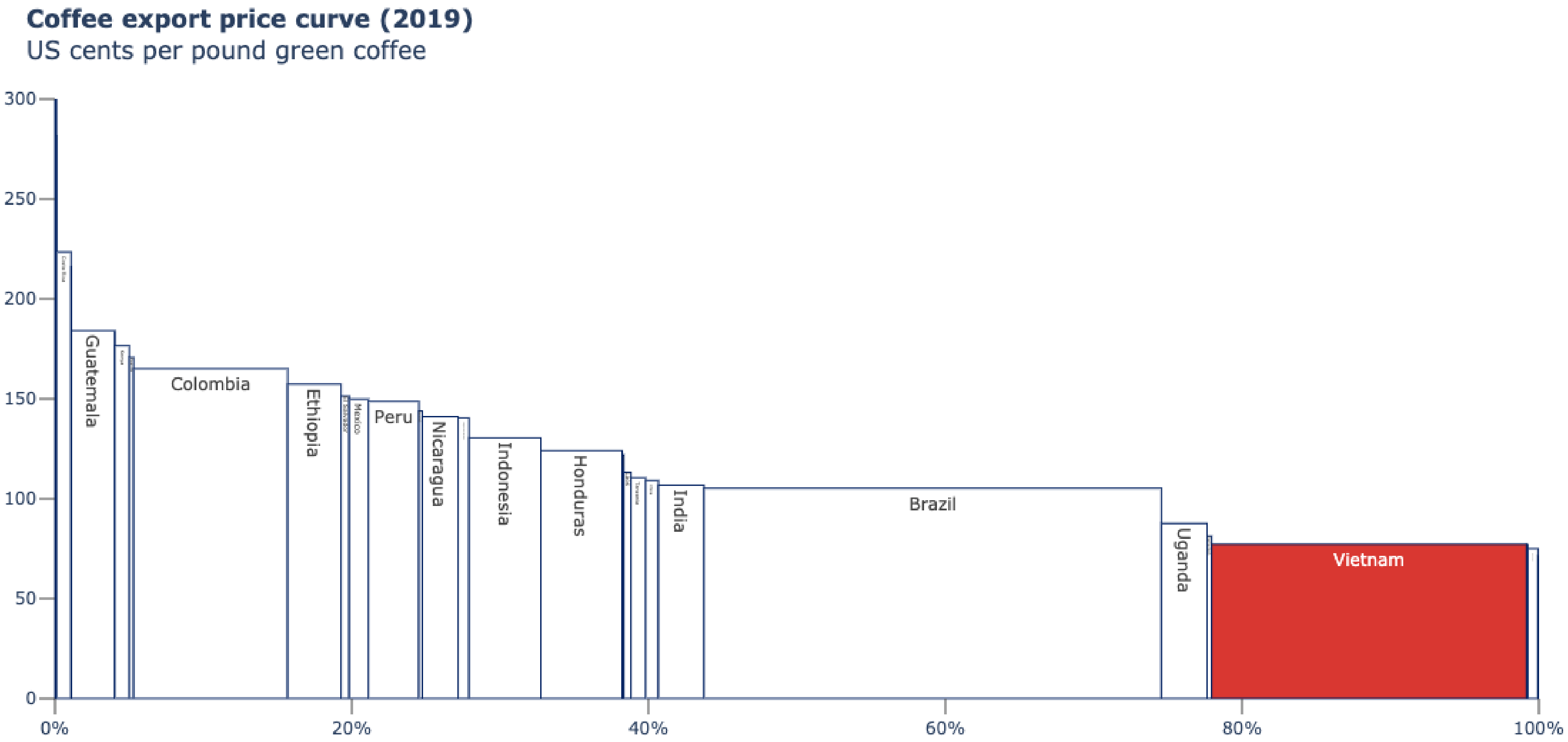
# Rwandan farmers earn 50-60% of the export price

**Illustrative Rwanda Arabica supply chain cost breakdown**
US$/kg green




Note: Cost of production does not include costs for installation of wet milling equipment, tree renovation or financing
* Normalized to March 2024 commodity prices – Arabica ICE "C" of $1.83 but adjusted for market differential of +$0.40 per pound green
** Includes farm tools, equipment, internal transport, etc.
Source: One Acre Fund analysis

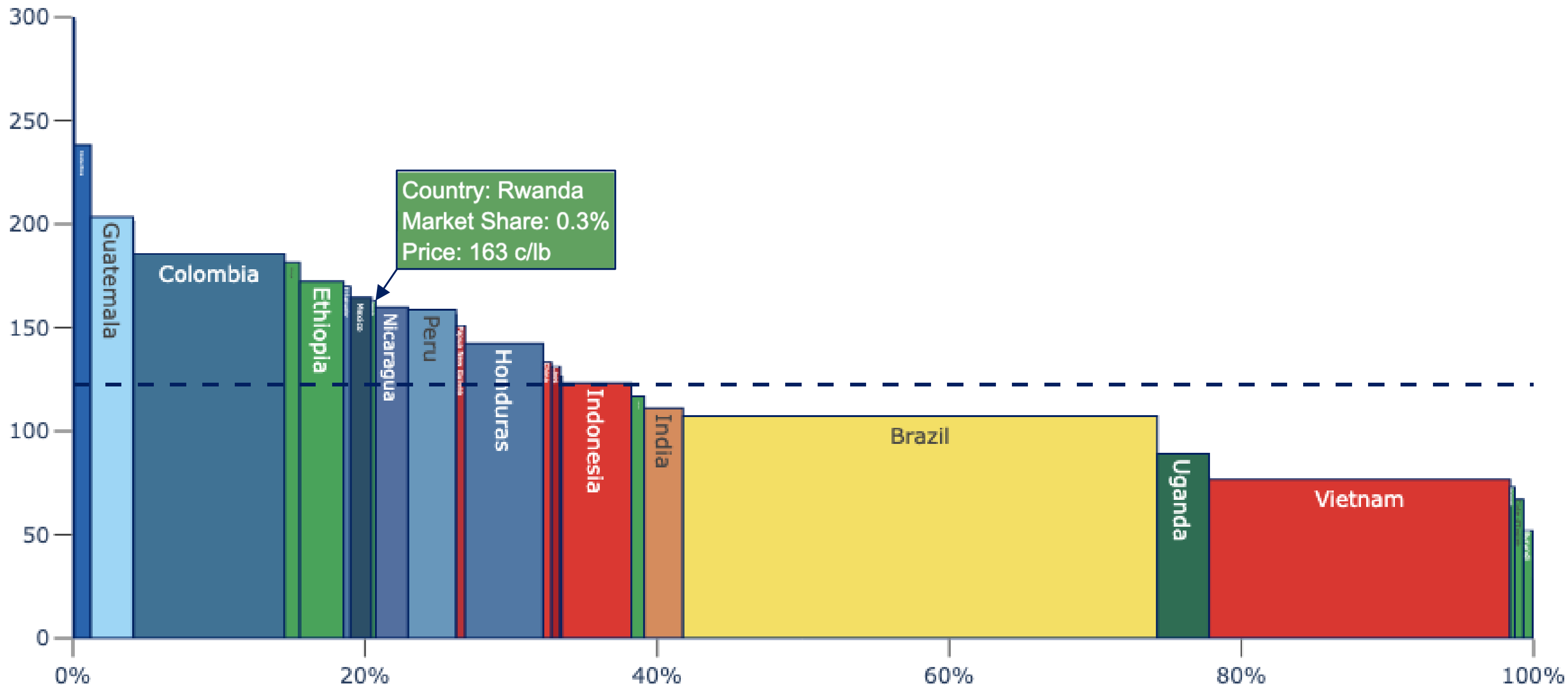
# Vietnam supplies ~20% of market at a low price




Source: COMTRADE

# Rwanda supplies <1% of market at a high price

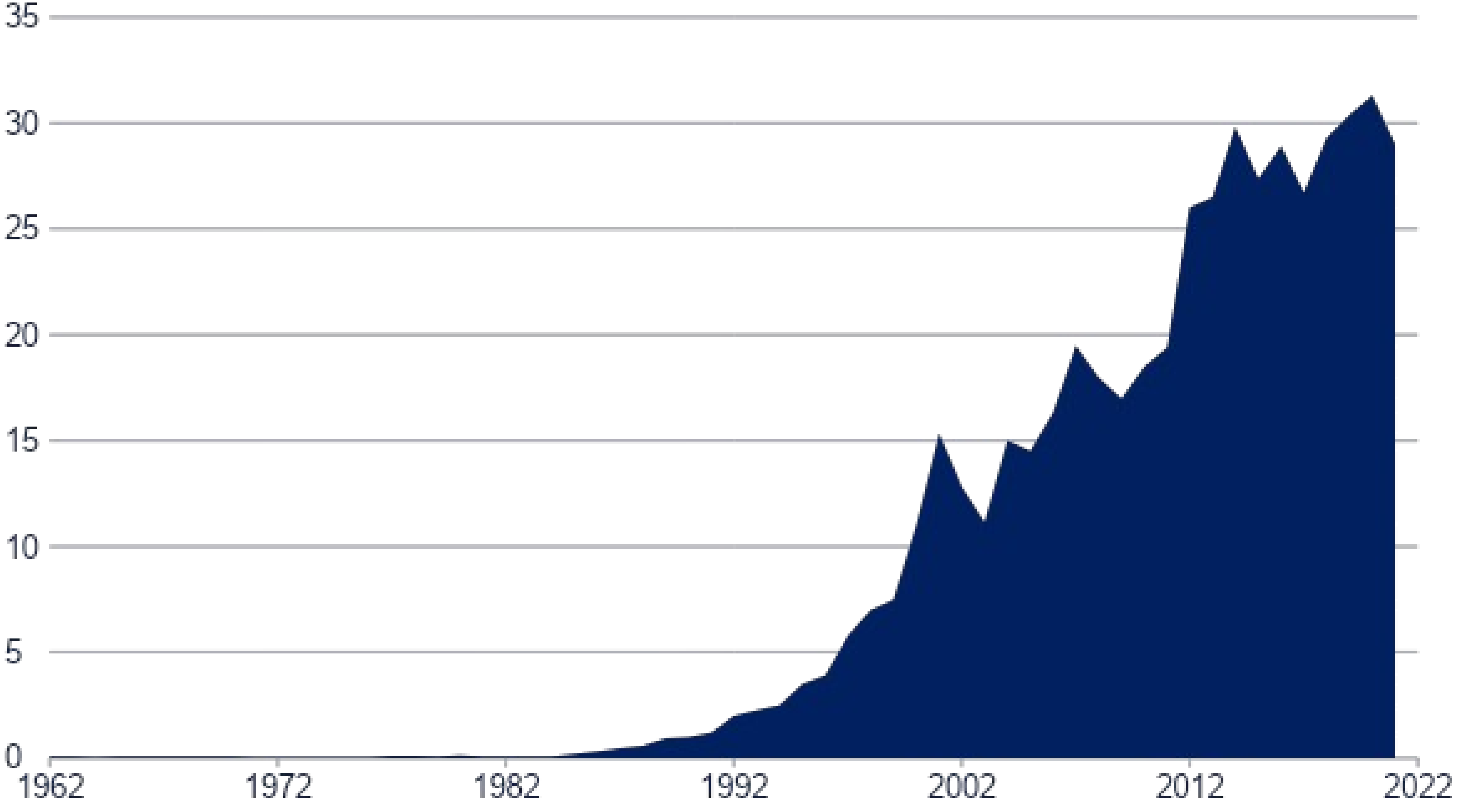
**2020** | 96M bags at avg price of 123 c/lb




Source: COMTRADE

# Vietnam increased its coffee production rapidly

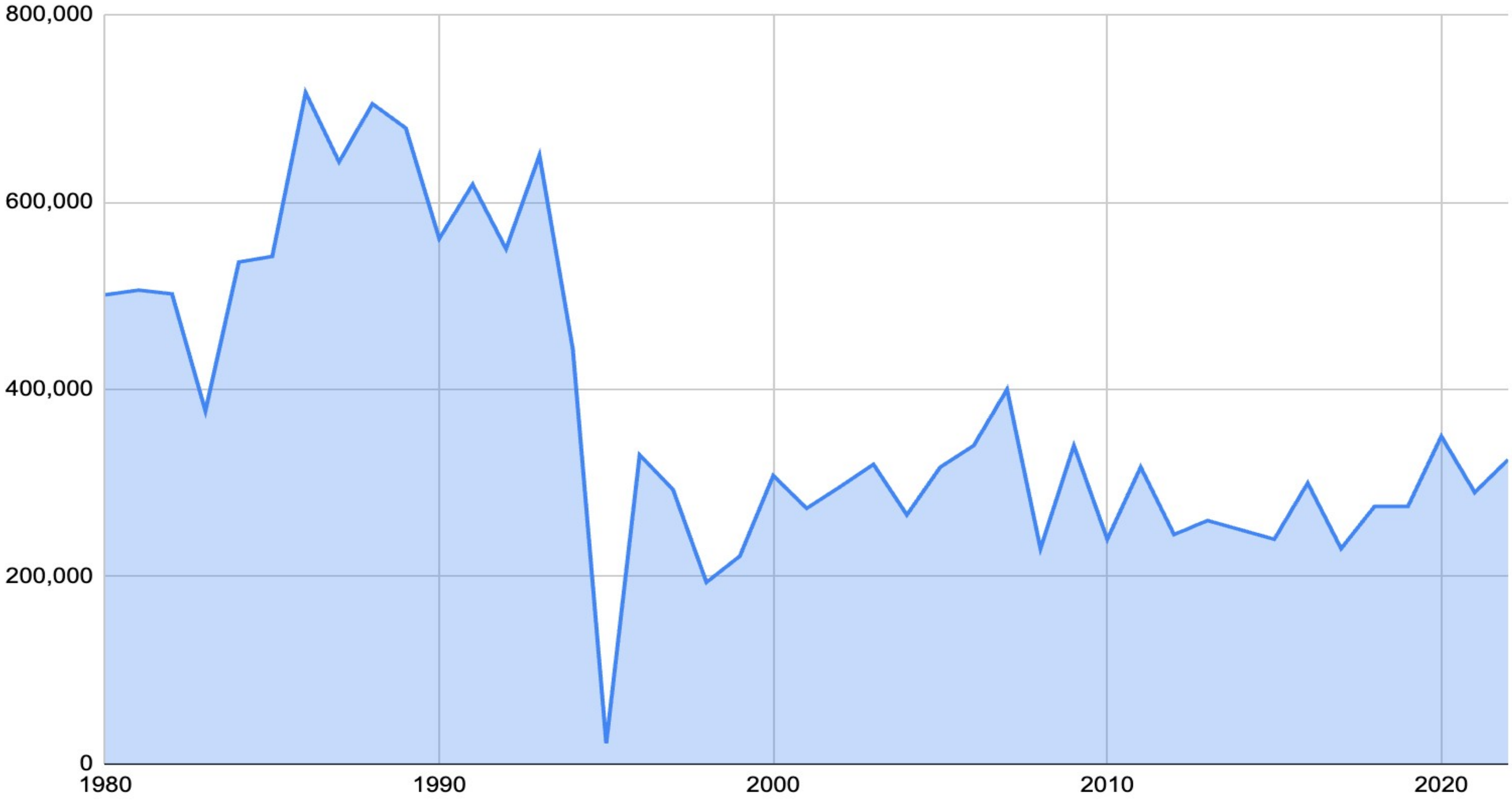
**Vietnam coffee production**
Bags (60-kg), millions




Source: USDA production figures

# Rwanda's production has been stable since 2000

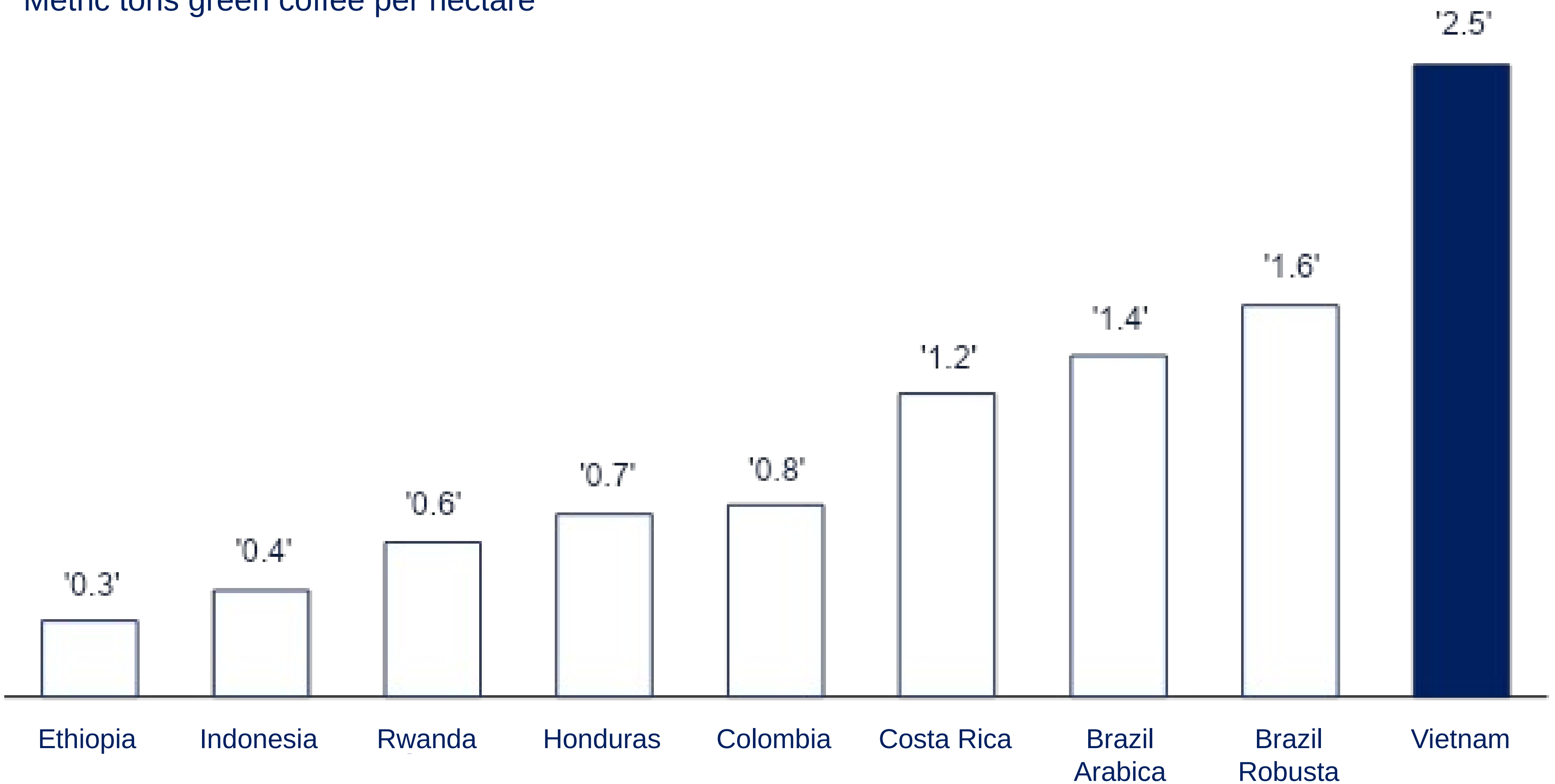
**Rwanda coffee production**
Bags (60-kg), millions




Source: USDA production figures

# Vietnamese farms have very high yields

**Average coffee farm yields***
Metric tons green coffee per hectare



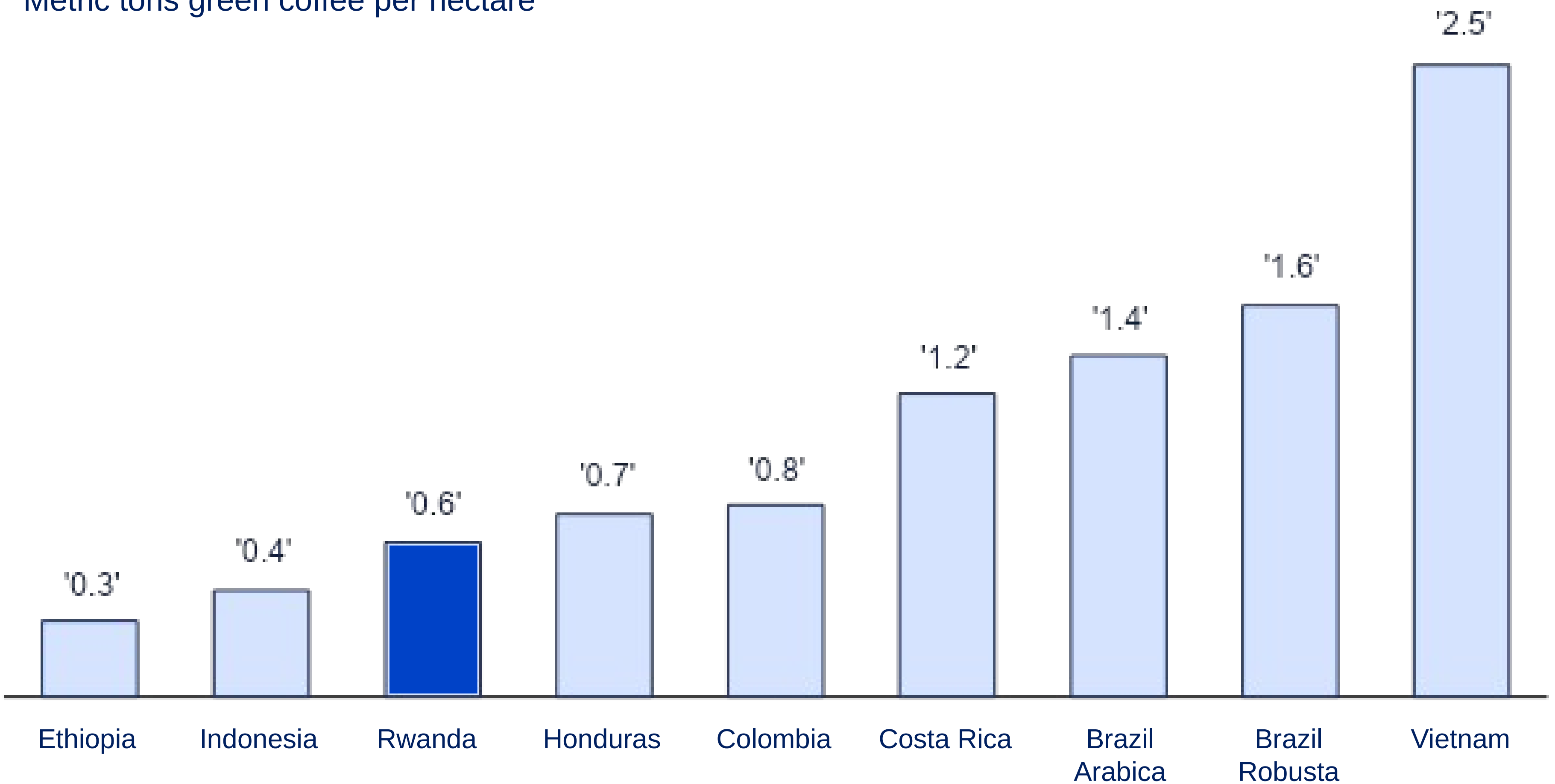

*National average based on total production (average of last two crops) and area under coffee; includes both Arabica and Robusta unless noted otherwise

Source: USDA; TechnoServe analysis

# Rwanda farms have average level yields

**Average coffee farm yields***

Metric tons green coffee per hectare

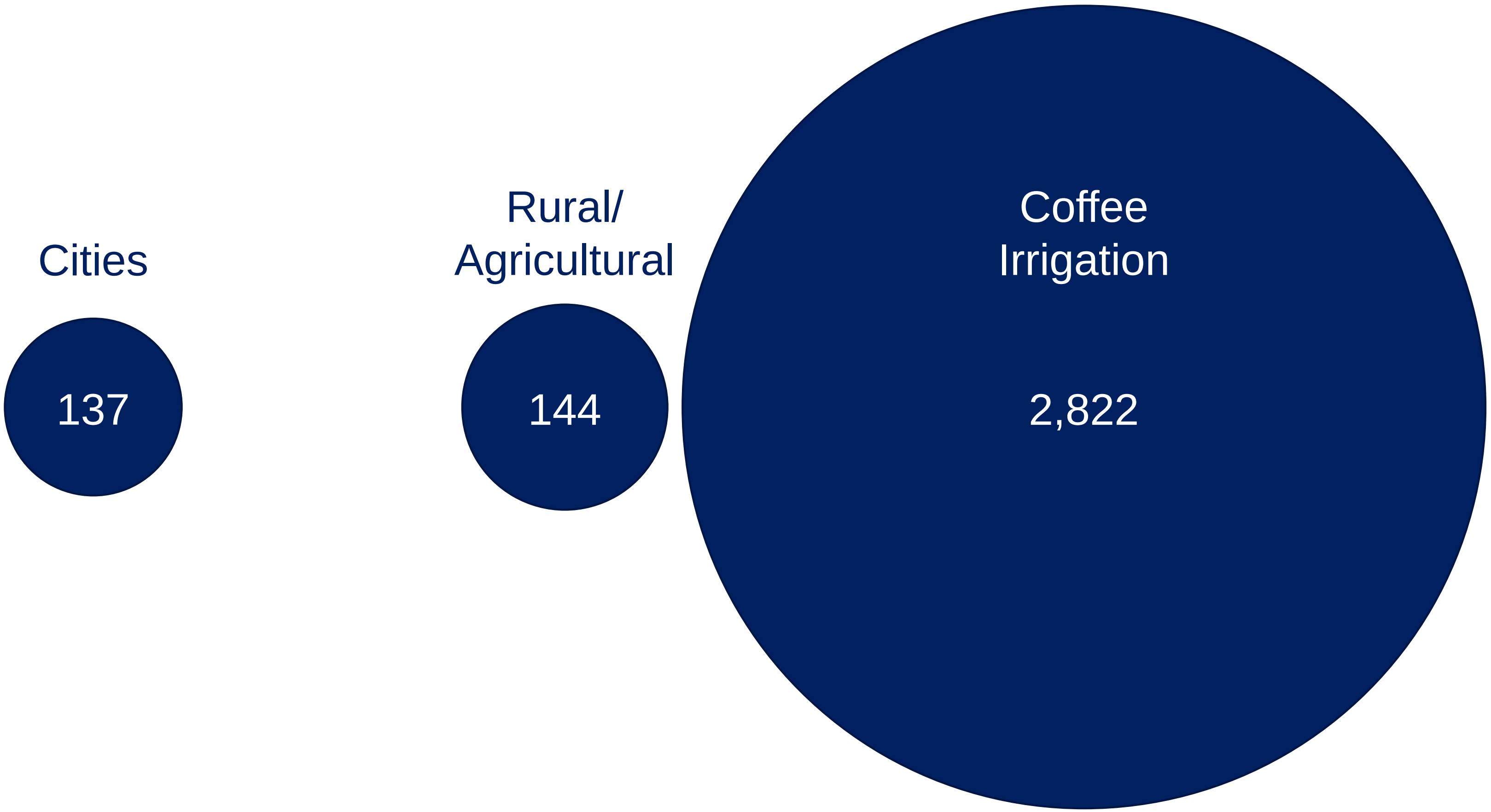



*National average based on total production (average of last two crops) and area under coffee; includes both Arabica and Robusta unless noted otherwise

Source: USDA; TechnoServe analysis

# Vietnam coffee has a large environmental footprint

**Total water demand in Vietnam's Central Highlands**
Tons per household* per year

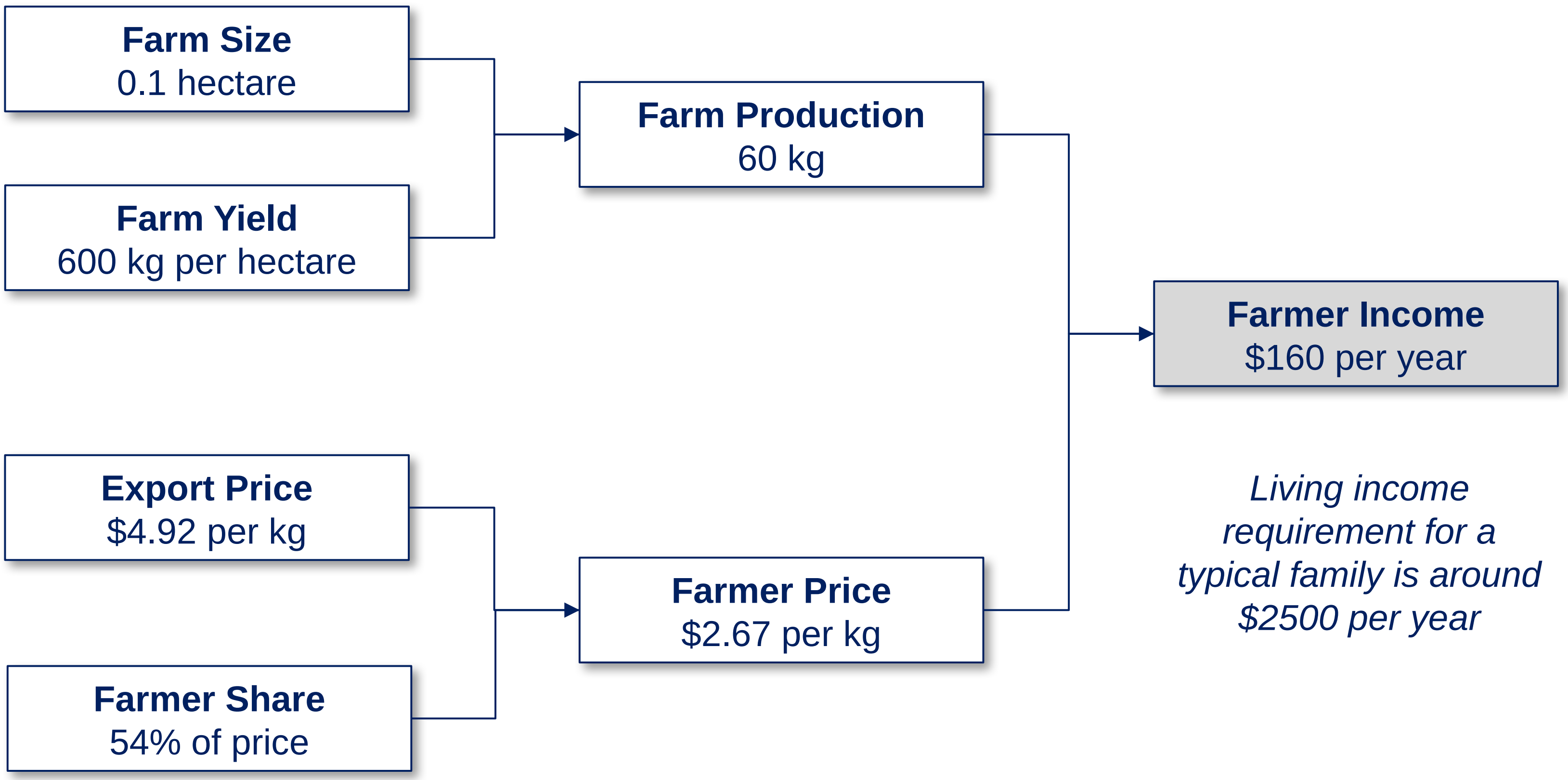



* Assumes average household size of 4.5

Source: D'Haeze 2004; Lu 2002; extrapolations to current estimated rates of urban and rural usage

# Many Rwandan farms struggle to earn a living income from coffee

**SIMPLIFIED MODEL**




Source: One Acre Fund analysis

# Vietnam review

1 **MAP**

- Approx. 600,000 mostly small-scale farmers
- Growth-focused government policies (land rights, credit access, lots of competition, etc.)

2 **BREAKDOWN**

- Farmers earn 95% of export price
- Margins for exporters / collectors are very slim (<1%)

3 **BENCHMARK**

- High farm yields and low costs relative to other coffee countries
- Production has a large environmental footprint

# Rwanda review

**1 MAP**

- Approx. 350,000 mostly small-scale farmers
- Very small farms, most sell through coffee washing stations

**2 BREAKDOWN**

- Farmers earn 50-60% of export price
- Strong institutional support provided by government (through tax)

**3 BENCHMARK**

- Average yields and high costs relative to other coffee countries
- Many farmers are unable to achieve a living income solely from coffee

# Recommendations for Vietnam’s coffee value chain

| | | |
|---|---|---|
| High | Reduce water footprint | Export roasted coffee direct to consumers |
| **Impact** | | |
| Low | Transfer higher share of export price to farmer | Boost local coffee consumption |
| | Low | High |

**Feasibility**

# Recommendations for Rwanda's coffee value chain

| Impact | Feasibility: Low | Feasibility: High |
|---|---|---|
| High | Transfer higher share of export price to farmer | Help smallholders improve quality and productivity |
| Low | Export roasted coffee direct to consumers | Boost local coffee consumption |

# Q&A

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# Practical advice

- Context, context, context
- Identify the right mix of stakeholders to interview
- Get diverse opinions
- Make it easy for people to give you data (e.g., carry a USB □)
- Know that official statistics aren’t always accurate
- Corroborate numbers with different sources
- Be OK going downstream (start at farm) and upstream (start at buyer)
- Talk through hypotheses with experts
- One-size-fits-all solutions are rare; segmentation is usually needed
- Keep slides simple

# Current questions

- How many coffee farmers are there in the world?
- What percentage of the world's coffee comes from smallholders?
- How many coffee households live below the global poverty line?
- How many coffee farming families will lose a child before the age of five?
- How many workers are there in the coffee industry?
- How many plots of coffee need to be mapped in order to meet EU deforestation requirements?
- How has the *real* price of coffee changed over the past 100 years?
- Where will the next 10 million bags of coffee come from -- and who will buy it?

# Deep Research

ChatGPT

Research completed in 13m · 30 sources

Share

1. **Global Coffee Farmers:** Approximately 12.5 million households farm coffee worldwide RISKMAP.FAIRTRADE.NET .
2. **Smallholder Contribution:** Roughly 70–80% of the world's coffee is produced by smallholder farmers FAIRTRADE.NET .
3. **Poverty in Coffee Farming:** At least 5.5 million coffee-farming families live below the international poverty line CARTO.COM .
4. **Child Mortality in Coffee Families:** In some coffee-growing regions, child mortality exceeds 10%, meaning about one in ten coffee-farming families will lose a child before age five EDEPOT.WUR.NL .
5. **Workers in the Coffee Industry:** Around 125 million people globally depend on the coffee industry for their livelihoods FAIRTRADE.ORG.UK .
6. **Mapping Coffee Plots (EU Deforestation Compliance):** About 80% of coffee farmers have not yet mapped their plots COMUNICAFFE.COM , implying roughly 10 million coffee farm plots will need geolocation mapping to meet the EU's deforestation-free requirements.
7. **Real Coffee Price (100-Year Trend):** In real terms, coffee bean prices have declined drastically over the past century, even reaching their lowest level in over 100 years (below 1930s Depression-era prices) in the early 2000s ICO.ORG .
8. **Future Supply and Demand (Next 10 Million Bags):** Based on current trends, the next 10 million bags of coffee will likely be supplied by increased output from leading producers like Brazil and Vietnam NASDAQ.COM , while the growing demand will come primarily from emerging markets in Asia (and Africa) alongside continued consumption in traditional markets MEDIUM.COM .

Sources

Ask anything

Search Deep research