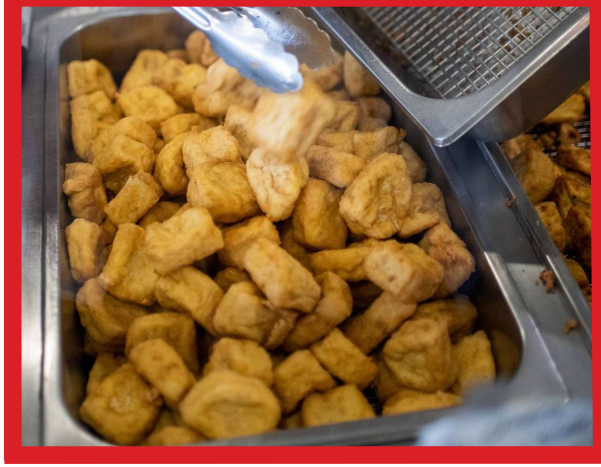


Economic Advantages of Utilizing Identity Preserved (IP) Soybeans

Randy Duckworth
Specialty Soya and Grains Alliance

DISCLAIMER

The following presentation is not intended to promote soybeans of a foreign origin. The presentation reviews 2 case studies showing the economic advantages of using specific varieties of IP soybeans for specific purposes in food processing and support further research for IP.

DEFINITION OF "IDENTITY PRESERVED" SOYBEANS

Identity Preserved (IP) soybeans are soybeans that maintain strict segregation and detailed tracking throughout the entire supply chain, from seed selection through production, handling, storage, and distribution to ensure specific traits and quality characteristics are preserved and delivered to the end user. IP Soybeans typically require extensive varietal research support and command premium prices due to the additional costs and management required for segregation and traceability.

Underlying study and data provided by Japnit Singh, COO of Yamada Spire (Singapore Office)

YAMADA CONSULTING & SPIRE

Economic Advantages of Utilizing Identity Preserved (IP) Soybeans

Financial Model and Case Studies

Malaysia	Vietnam
Year 2021	Year 2024
Soymilk Production	**Tofu** Production
	

Methodology: Interviews with Buyers + Discussions with Supplier Experts

Key Steps

1. **Analyze** the **manufacturing process**
   - **Stage 1:** Procuring and cleaning of soybeans
   - **Stage 2:** Extracting soybase / processing and production of soymilk
   - **Stage 3:** Converting soymilk base to soy beverage / producing tofu from soymilk
2. **Assess qualitative benefits** of using IP beans
3. **Map process impact**
4. **Quantify financial impact**
5. **Model financial scenarios**

Economic Advantages of Utilizing Identity Preserved (IP) Beans

Case Study 1

Vietnam – Tofu Production

Overview of Vietnam (2023)

Population (2023)[1]	100.3M
GDP (2023)[1]	US$430B
Ease of Doing Business Index Ranking[2,a]	70

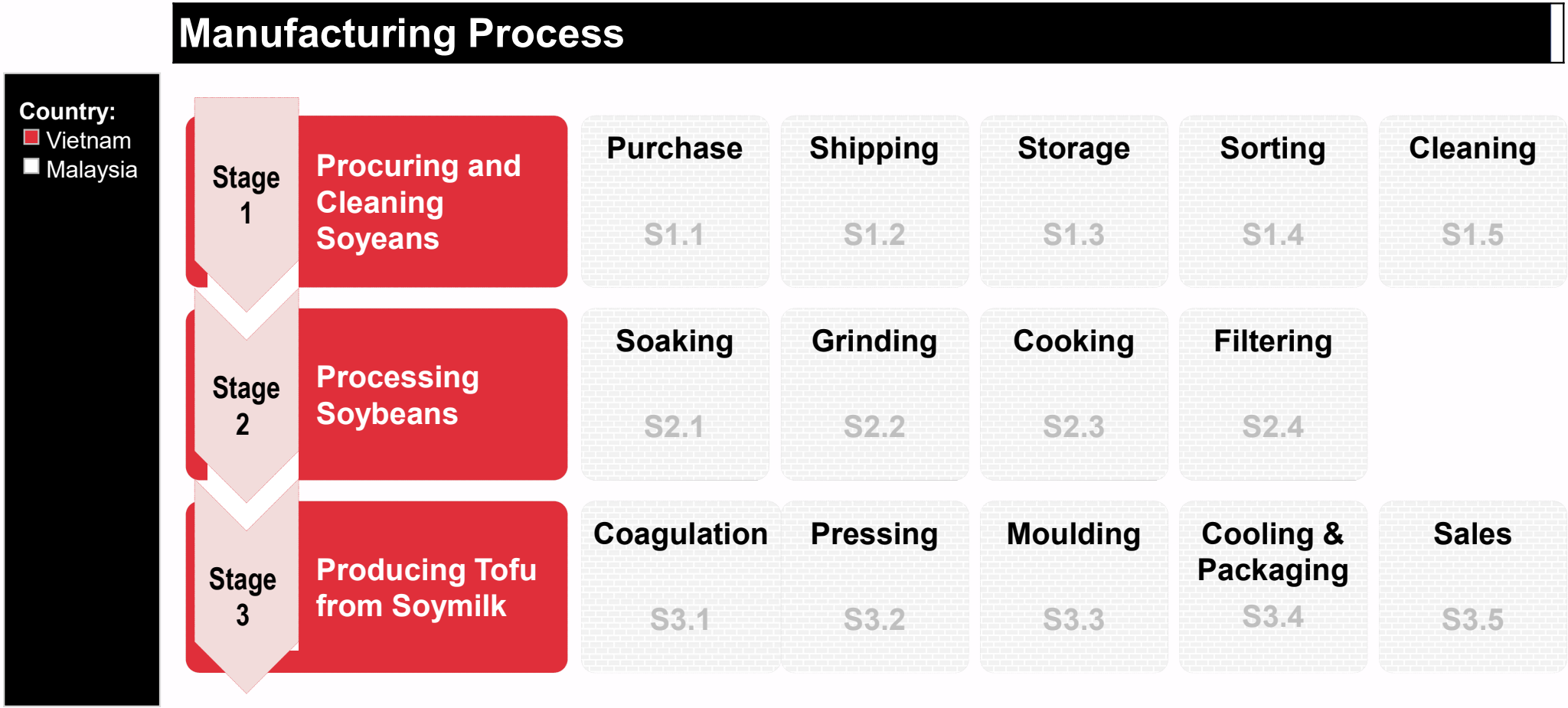
Vietnam Soy Import Market Size (2022/2023)

Soy Type	Total Soy Imported Volume (MMT)	US Soy Imported Volume	
		(MMT)	(%)
Soy Complex	6.7	1.0	18.6%
Soybean Meal	4.9	0.3	6.2%
Whole Bean	1.3	0.7	51.9%
Soy Food	0.5	0.3	59.2%
Soybean Oil	0.06	--	--

Note: (a) Ranking was based on 190 economies

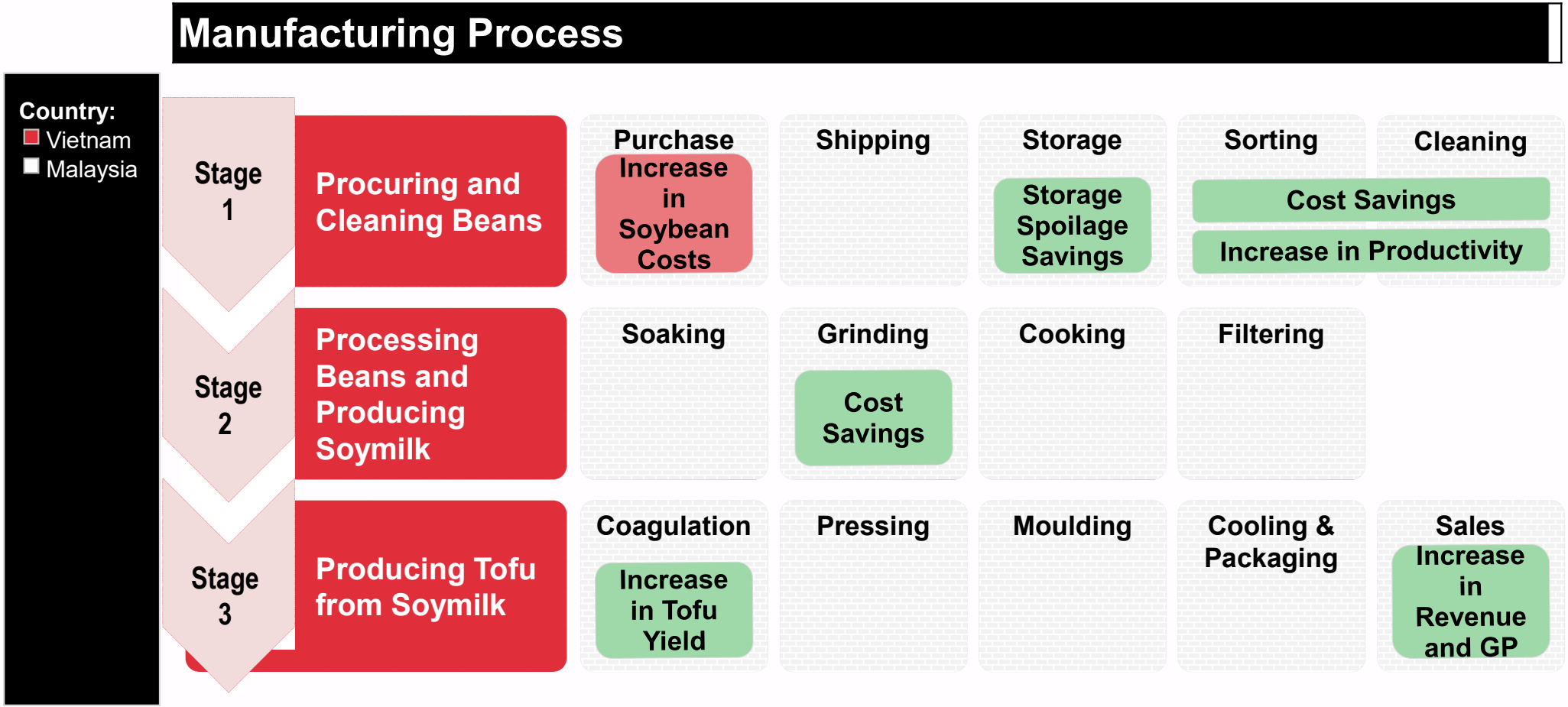
Sources: (1) World Bank; (2) The World Bank, Ease of Doing Business Rankings, 2019; (3) USSEC, Market Snapshot: Vietnam, 2024

Manufacturing Process for a Large Size Tofu Manufacturer in Vietnam



Note: (a) Large size tofu manufacturer = 4,000kg – 5,000kg daily soybean usage
Sources: (1) Interviews with 3 tofu manufacturers and 1 SSGA expert; and (2) Y&S analysis

IP Impact for a Large Size Tofu Manufacturer in Vietnam

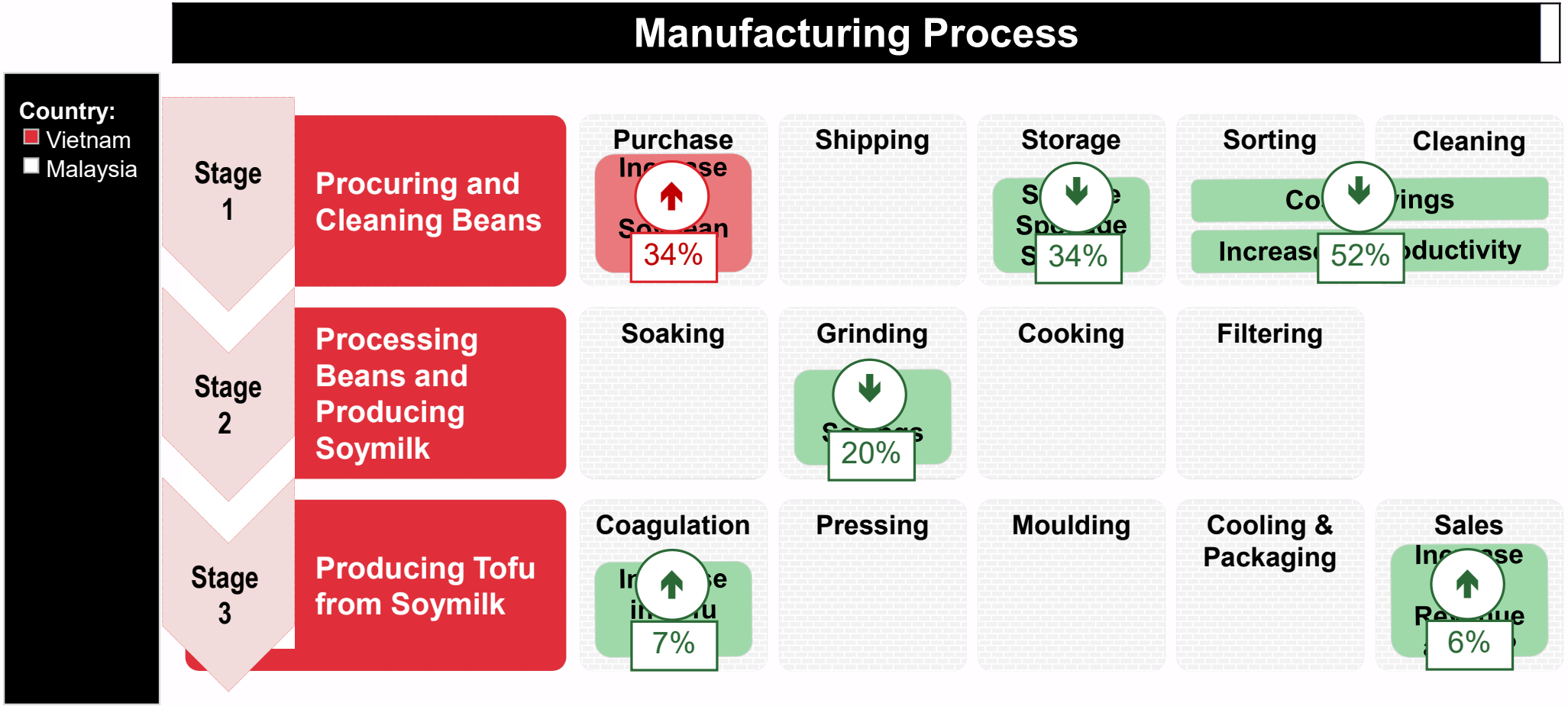


Note: (a) Large size tofu manufacturer = 4,000kg – 5,000kg daily soybean usage
Sources: (1) Interviews with 3 tofu manufacturers and 1 SSGA expert; and (2) Y&S analysis

Quantitative Analysis for a Large Size Tofu Manufacturer in Vietnam

		Non-IP Soybeans *36% Protein*	IP Soybeans *40% Protein*	
S1.1-S1.3 Purchase and Storage	▸Soybeans Processed per Year	1,500,000 kg	1,500,000 kg	
	▸Soybeans Storage Spoilage Allowance	5%	0%	
	Soybeans Purchased per Year	**1,578,947**	**1,500,000 kg**	***78,947 kg***
	▸Soybean Cost Price	$0.64 / kg	$0.90 / kg	
	Soybean Costs per Year	**$1,009,768**	**$1,348,988**	***$339,219***
S3.1 Coagulation	**Soybeans Processed per Year**	**1,500,000 kg**	**1,500,000 kg**	
	▸Tofu Yield from 1 kg of Soybeans	2.8 kg of Tofu	3.0 kg of Tofu	
	Total Tofu Produced per Year	**4,200,000 kg**	**4,500,000 kg**	***300,000 kg***
S3.5 Sales	▸Tofu Selling Price	$2.26 / kg	$2.40 / kg	**6% increase in price**
	Sales Revenue per Year	**$9,512,916**	**$10,791,900**	***$1,278,984***
	Gross Profit per Year	**$8,503,148**	**$9,442,913**	***$939,765***
S1.4 Sorting	▸Labor Costs for Sorting per Year (3600 Hours per Yr @$1.2/hr)	$4,317	$0[c]	
	Sorting Costs per Year	**$4,317**	**$0**	***$4,317***
S1.5 Cleaning	▸Labor Costs for Cleaning per Year (600 Hours per Yr @$1.2/hr)-	$791	$396	
	▸Utility Costs for Cleaning per Year	$5,316	$2,658	
	Cleaning Costs per Year	**$6,107**	**$3,054**	***$3,054***
S2.2 Grinding	▸Grinding Stone Replacement Costs per Year- 180 replacements	$1,679	$560	***Reduced to 60 replacements***
	▸Other Maintenance Costs (e.g. Labor Maintenance, Filter Replacement, etc.) per Year	$4,317	$4,237	
	Grinding Maintenance Costs per Year	**$5,996**	**$4,796**	***$1,199***

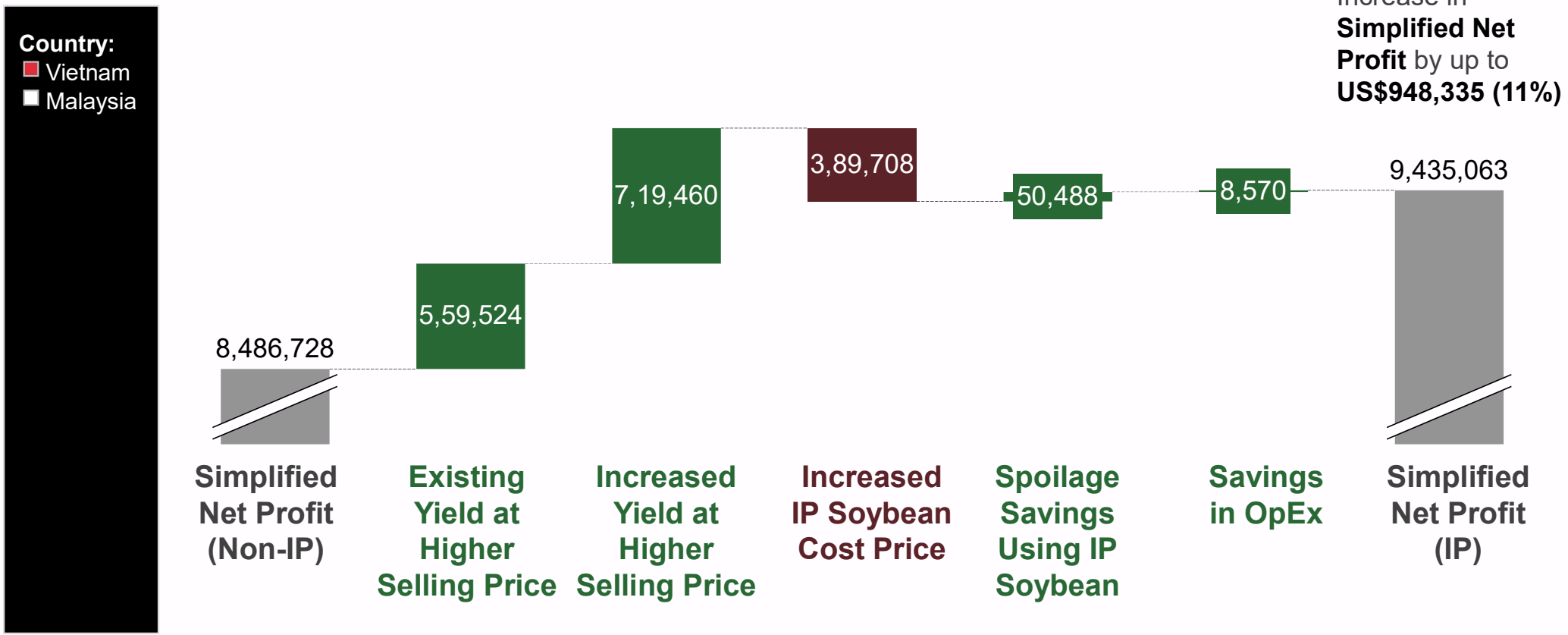
IP Impact for a Large Size Tofu Manufacturer in Vietnam



Note: (a) Large size tofu manufacturer = 4,000kg – 5,000kg daily soybean usage
Sources: (1) Interviews with 3 tofu manufacturers and 1 SSGA expert; and (2) Y&S analysis

Putting it all Together…

Financial Impact through out the Manufacturing Process



Note: (a) Large size tofu manufacturer = 4,000kg – 5,000kg daily soybean usage
Sources: (1) Interviews with 3 tofu manufacturers and 1 SSGA expert; and (2) Y&S analysis

Additional Benefits from increased productivity

Manufacturing Process

Country:
- ☒ Vietnam
- ☐ Malaysia

Financial Proofpoint 3

IP soybeans can **enhance Productivity** and **decrease batch production time**

	Non-IP	IP
Processing Capacity	5,000 kg per day (1,500 mt per year)	
Cycle Duration *(1 Production Cycle; Excluding Soaking)*	213 minutes per batch	200 minutes per batch
Soybeans Processed Per Batch	150 kg per day	
Duration – Sorting	6 hours per day	--
Duration – Cleaning	2.2 hours per day	1.1 hours per day

Verbatims

"The production involves 33 batches in one day, run in a staggered manner"

*"Sorting hours take longer…because it is manual sorting, difficult to control time. However, **because we buy IP soybeans that have been sorted, we can cut this step** in the production process…"*

*"[In the cleaning stage] We take 2.2 man-hours daily for Non-IP soybeans and **1.1 man-hours for IP soybeans**…"*

Note: (a) Large size tofu manufacturer = 4,000kg – 5,000kg daily soybean usage; (b) VND 1 = US$ 0.00003997
Sources: (1) Interviews with 3 tofu manufacturers and 1 SSGA expert; and (2) Y&S analysis

Additional Benefits from Increased Productivity

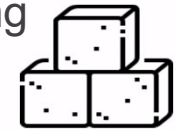
Manufacturing Process | Qualitative Benefits | Process Impact | Financial Impact | **Financial Scenarios**

Country:
- ■ Vietnam
- ■ Malaysia

IP soybeans can **enhance productivity** and **decrease batch production time**

Increase in Productivity; reducing process time per batch by **up to 6%**

✓Reduction in time required in cleaning and sorting processes



Time Savings | **Extra Production Capacity**

13 minutes
per batch

7 hours
Running time per 5000 kg of Tofu

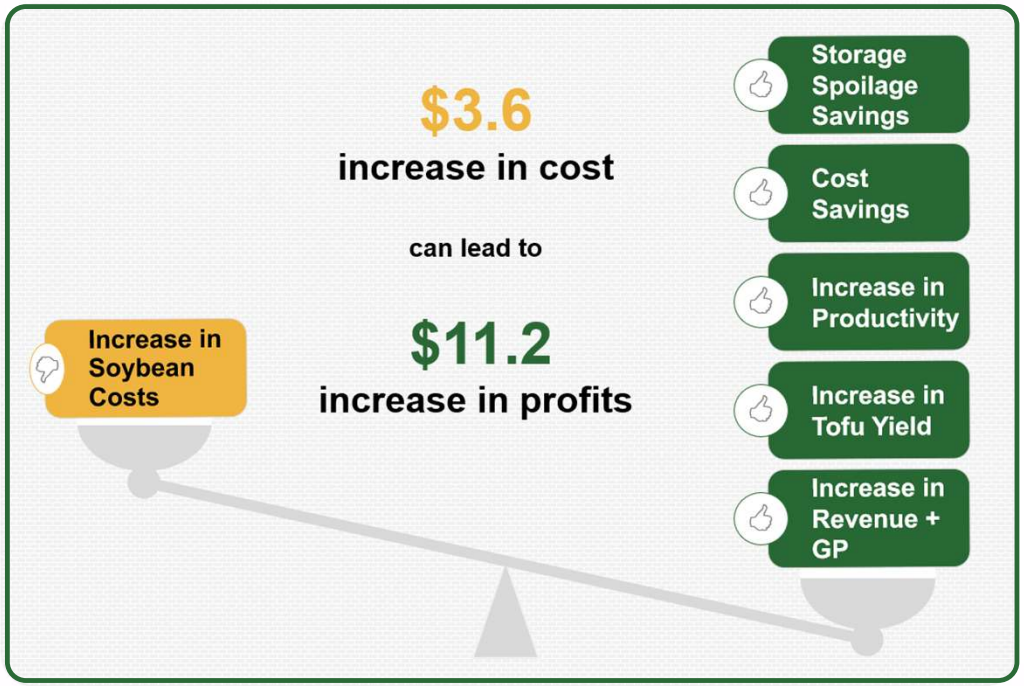
2 batches
Running time per day

900 kg tofu
per day

Note: (a) Large size tofu manufacturer = 4,000kg – 5,000kg daily soybean usage
Sources: (1) Interviews with 3 tofu manufacturers and 1 SSGA expert; and (2) Y&S analysis

Key Take away: For Every $100 Currently Made in Revenue, A Tofu Producer can see Benefits by Switching to IP soy.

	Non IP (36%)	IP (44%)
Revenue	$100	107.1
Revenue from Premium	0	6.4
Cost of Soybeans	-$10.1	-14.2
Cost of Wastes Soy beans	-$0.5	0
Gross Profit (Simplified)	-$89.4	-99.4
Sorting Labor	-$0.05	0
Cleaning	-$0.06	-0.03
Grinding Maintenance	-$0.06	-0.05
Net Profit	**$89.20**	**$99.31**



6% Additional Production Capacity

Economic Advantages of Utilizing Identity Preserved (IP) Beans

Case Study 2

Malaysia – Soymilk Production

Overview of Malaysia

Population (2023)[1]	35.1M
GDP (2023)[1]	US$400B
Ease of Doing Business Index Ranking[2,a]	12

Malaysia Soy Import Market Size (2022/2023)[3]

Soy Type	Total Soy Imported Volume (MMT)	US Soy Imported Volume	
		(MMT)	(%)
Soy Complex	2.3	0.3	13.5%
Soybean Meal	1.5	0.09	6.2%
Whole Bean	0.8	0.2	28.7%
Soy Food	0.2	0.07	40.0%
Soybean Oil	0.1	--	--

Note: (a) Ranking was based on 190 economies

Sources: (1) World Bank; (2) The World Bank, Ease of Doing Business Rankings, 2019; (3) USSEC, Market Snapshot: Vietnam, 2024

Manufacturing Process for Large Soymilk Manufacturer in Malaysia

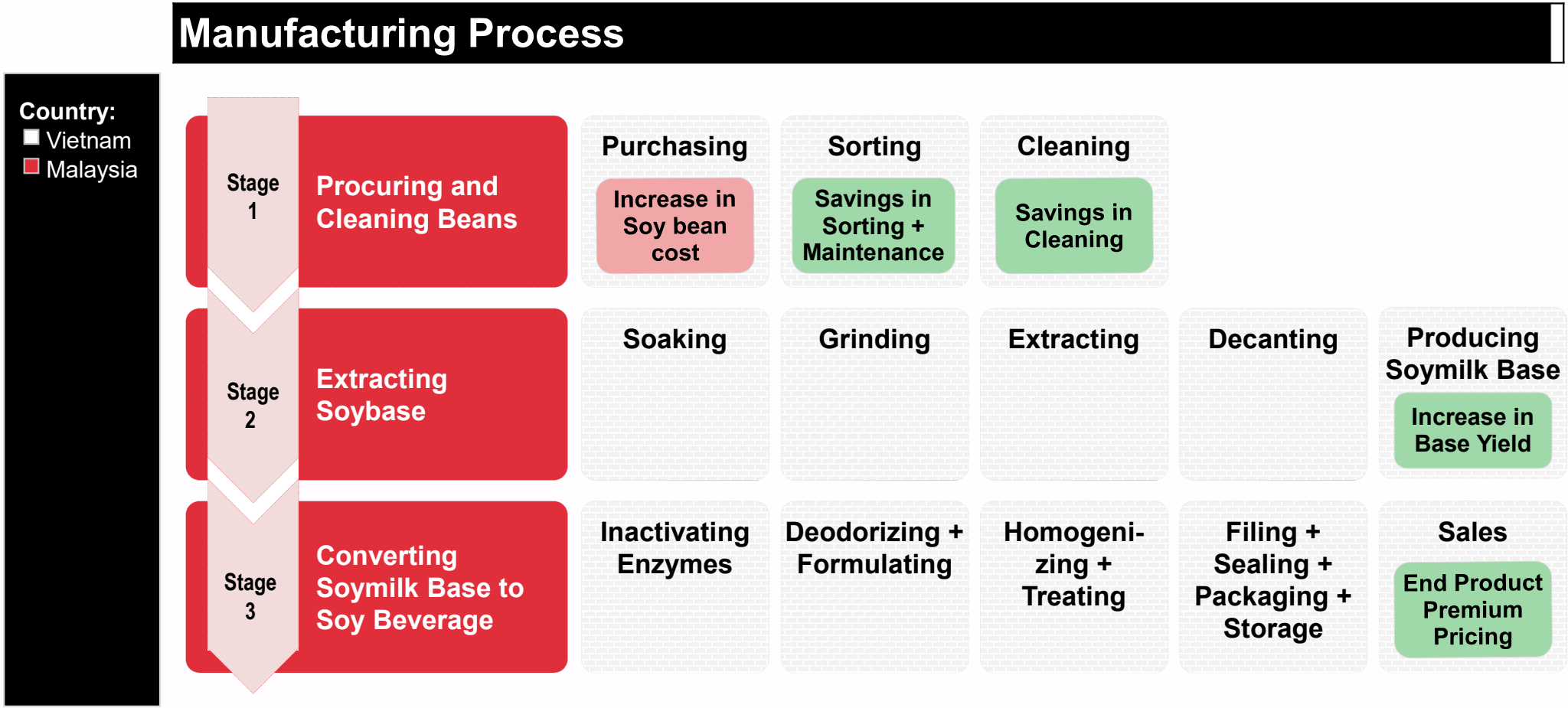
Manufacturing Process

Country:
- ☐ Vietnam
- ■ Malaysia

Stage 1	Procuring and Cleaning Beans	Purchasing S1.1	Sorting S1.2	Cleaning S1.3		
Stage 2	Extracting Soybase	Soaking S2.1	Grinding S2.2	Extracting S2.3	Decanting S2.4	Producing Soymilk Base S2.5
Stage 3	Converting Soybase to Soy Beverage	Inactivating Enzymes S3.1	Deodorizing + Formulating S3.2	Homogeni-zing + Treating S3.3	Filing + Sealing + Packaging + Storage S3.4	Sales S3.5

Note: (a) Assuming yearly purchase amount of 3,500 MT soybean raw materials and yearly production of 40 million litres of soymilk
Sources: (1) Interviews with one of the largest and most well-known F&B manufacturer that has the largest soymilk production operations in Malaysia and across Asia ; and (2) Y&S analysis

IP Impact for a Large Soymilk Manufacturer in Malaysia



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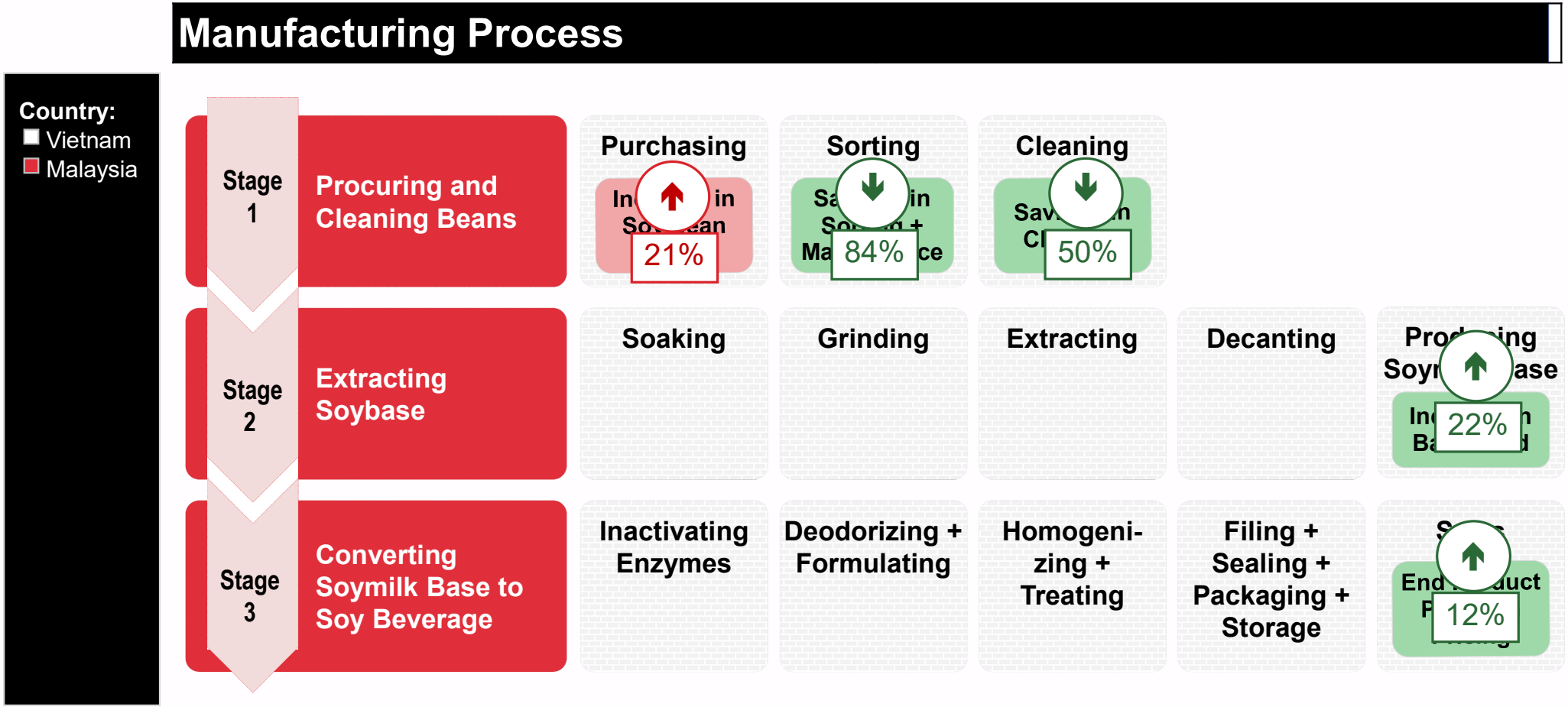
Quantitative Analysis for a Large Soymilk Manufacturer in Malaysia

		Non-IP Soybeans *36% Protein*	IP Soybeans *40% Protein*	
S1.1-S1.3 Purchase and Storage	‣Soybeans Processed per Year	3,500 MT	3,500 MT	
	‣Soybeans Storage Spoilage Allowance	10%	0%	
	Soybeans Purchased per Year	**3,889MT**	**3500 MT**	***389 MT***
	‣Soybean Cost Price	$0.67 / kg	$0.90 / kg	
	Soybean Costs per Year	**$2,605,556**	**$3,150,000**	***$544,444***
S3.1 Coagulation	**Soybeans Processed per Year**	**3,500 MT**	**3,500 MT**	
	‣Soy Milk Yield from 1 kg of Soybeans	10.37	12.6	
	Soy Milk Produced per Year	**30.6 M lt**	**44.4 M lt**	
S3.5 Sales	‣Soy Milk Selling Price	$0.24 / lt	$0.27 / lt	**12% increase in price**
	Sales Revenue per Year	**$8,709,120**	**$11,899,336**	***$3,177,216***
	Gross Profit per Year	**$6,103,546**	**$8,736,336**	***$2,632,772***
S1.4 Sorting	‣Labor Costs for Sorting per Year (1000 Hours per Yr @$6.2/hr)	$6,225	0	***$6,225***
	Sorting Costs per Year			
S1.5 Cleaning	‣Labor Costs for Cleaning per Year (1000 Hours per Yr @$6.2/hr)-	$10,346	$5,173	***Cleaning frequency reduced by 50%***
	‣Utility Costs for Cleaning per Year	$4,121	$2,061	
	Cleaning Costs per Year	**$14,467**	**$7,233**	***$7,233***
S2.2 Maintenance	‣Other Maintenance Costs (e.g. Labor Maintenance, Equipment, etc.) per Year	1927	1284	***$634***
	Grinding Maintenance Costs per Year	**$1927**	**$1284**	

IP Impact for a Large Soymilk Manufacturer in Malaysia



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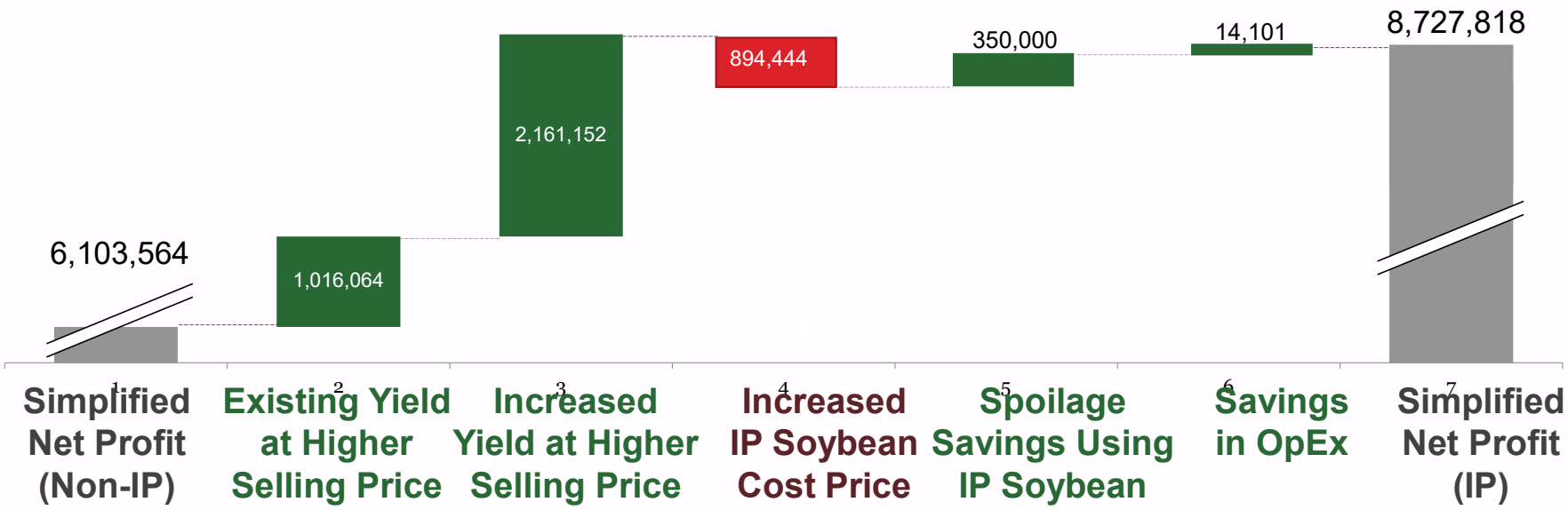
Putting it all Together…

Financial Impact through out the Manufacturing Process

Country:
- Vietnam
- Malaysia

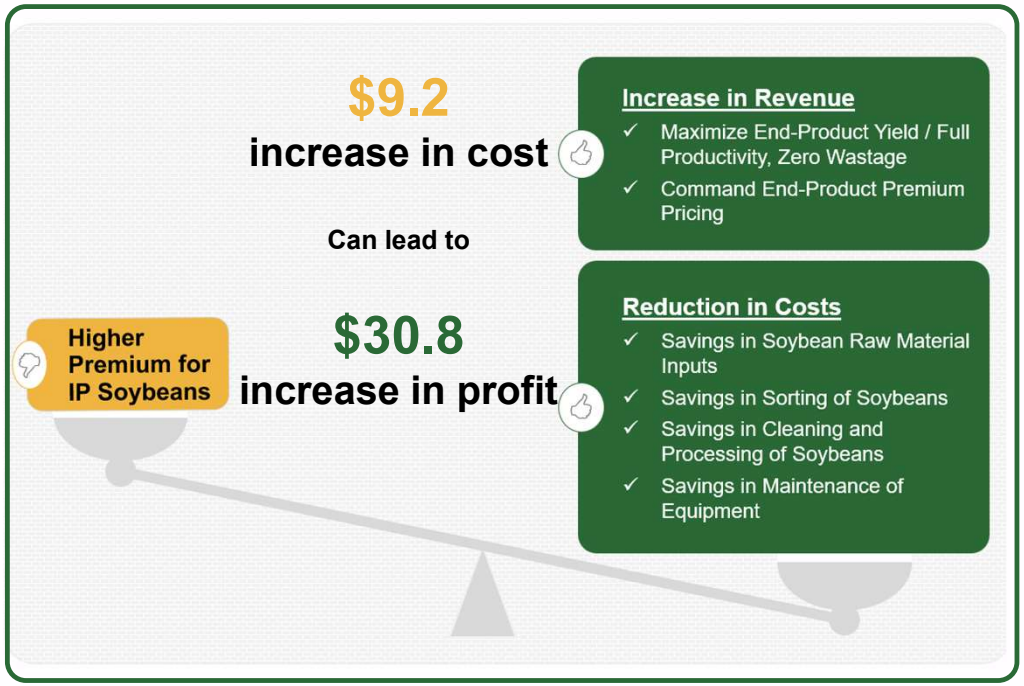
Increase in **Simplified Net Profit** by up to **US$2,646,873(43%)**



Note: (a) Large size tofu manufacturer = 4,000kg – 5,000kg daily soybean usage
Sources: (1) Interviews with 3 tofu manufacturers and 1 SSGA expert; and (2) Y&S analysis

Key Take away: For Every $100 Currently Made in Revenue, a Soymilk Producer can see Benefits by Switching to IP soy.

	Non IP (36%)	IP (44%)
Revenue	100	122.2
Revenue from Premium	0	14.7
Cost of Soybeans	-26.9	-36.2
Cost of Wastes Soy beans	-2.99	0
Gross Profit (Simplified)	-70.1	-100.7
Sorting Labor	-0.07	0
Cleaning	-0.12	-0.06
Grinding Maintenance	-0.02	0-.01
Net Profit	**$69.88**	**$100.65**



Additional Production capacity

IP Advantage

Higher premium paid for IP soybean

In return for higher throughput & margin, together with improved quality, consistency and traceability (and other qualitative benefits)

Source: Spire estimates and analysis

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