Asian Bicycle Parts Sourcing

Memo on Labor Markets, Prices, and Inflation

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Recommendation

I recommend sourcing semi custom bicycle parts from three countries in a diversified approach: **Indonesia** for volume production, **India** as a long term strategic partner, and **Malaysia** for precision components. This recommendation emerges from screening 32 manufacturing plausible Asian countries on production cost, price stability, and manufacturing capability.

Indonesia offers the third lowest unit labor cost among all Asian countries with stable inflation that would take over 30 years to double costs. India combines a competitive unit labor cost (0.103) with the highest youth unemployment (23%) of any major economy, meaning tens of millions of young workers are available for manufacturing, ensuring wage stability for the next decade. Malaysia brings the highest total factor productivity and deepest manufacturing ecosystem of the three, making it the right partner for components where quality outweighs cost.

Analytical Framework

A sourcing decision for bicycle parts must answer three questions: Where is production cheapest per unit of output? Will those costs remain stable over a five year contract? Does the country have the manufacturing infrastructure to deliver?

Measuring True Production Cost

Low wages alone do not mean low cost. A country with cheap labor but low productivity can cost more per bicycle part than a moderately priced country where workers produce more output per hour. The metric that captures this is **Unit Labor Cost**:

$$\text{ULC} = \frac{\text{Manufacturing Wages (annual, USD)}}{\text{GDP per Person Employed (PPP \$)}}$$

I use actual manufacturing sector wages from the International Labour Organization rather than GDP per capita, because GDP per capita includes high paying service sectors and overstates factory costs by 30 to 50% in middle income countries. While ULC captures today's cost, **Total Factor Productivity** (TFP), the efficiency term (A) in the Solow production function ($Y = A \times K^{\alpha} \times L^{1-\alpha}$), reveals whether that advantage will last. Rising TFP means a country can absorb wage increases without raising unit costs. Flat TFP means growth depends on capital accumulation, which faces diminishing returns.

I set the initial filter at ULC ≤ 0.25, meaning each dollar of wages must produce at least four dollars of output. Manufacturing must exceed 10% of GDP to ensure a minimum supplier ecosystem. Twenty countries pass this threshold (Figure 1, next page; Appendix Table A1).

Testing Price Stability

Inflation determines whether today's competitive cost will survive a multi year contract. The Rule of 70 makes this concrete: at 6% annual inflation, costs double in roughly 12 years. I set the inflation cutoff at 6%, which eliminates Turkey (58.5%), Pakistan (12.6%), Bangladesh (10.5%), Uzbekistan (9.6%), Myanmar (8.8%), and Kazakhstan (8.7%). Armenia, Jordan, and Saudi Arabia are removed: the first two have structural unemployment without industrial capacity to absorb it, and Saudi Arabia's factory wages depend on government quotas rather than market forces.

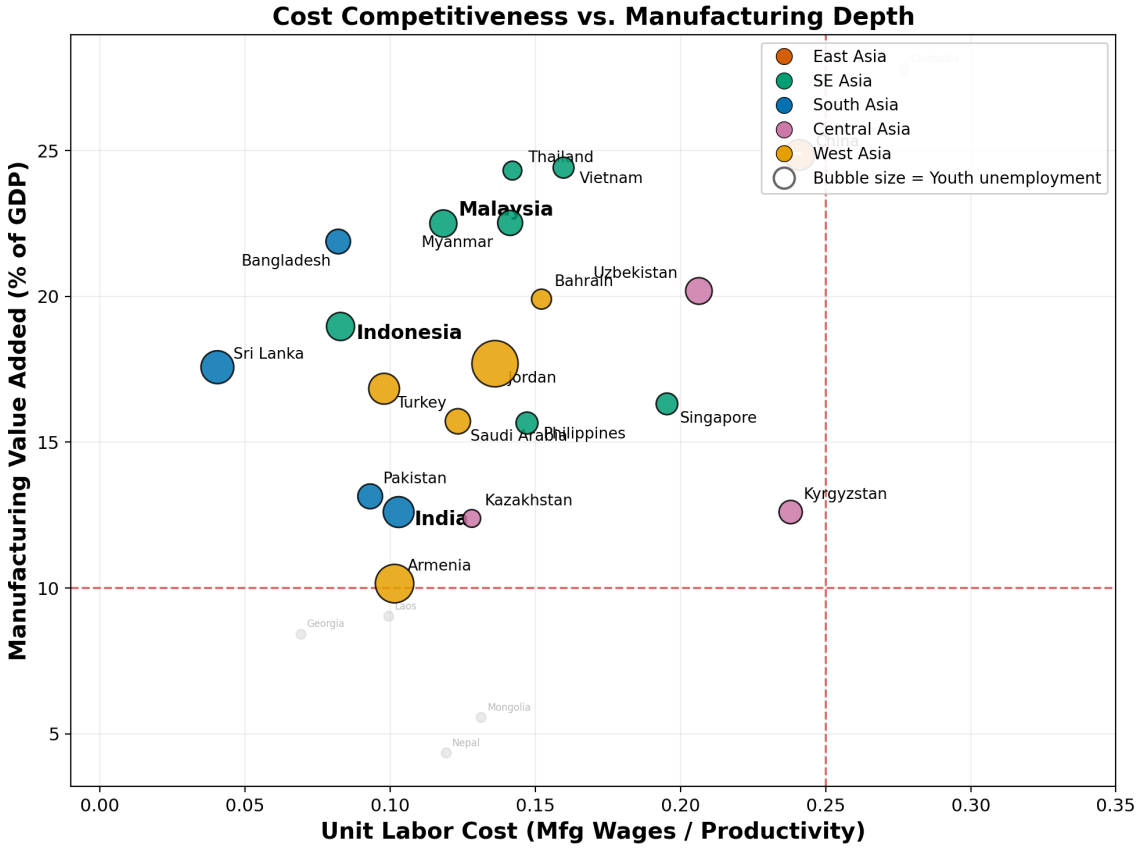

Figure 1: ULC vs. manufacturing depth. Bubble size = youth unemployment. Source: ILO, World Bank.

Figure 2a (next page) plots the shortlisted countries on the Phillips Curve: inflation against unemployment, with bubble size reflecting youth unemployment. Beyond inflation, I consider whether a country has workers available for new manufacturing. The most direct signal is **youth unemployment**: young unemployed workers are exactly the population that enters factory jobs. India's 23% youth unemployment represents a large pipeline of future manufacturing labor. Vietnam's 6% means the pipeline is thin. When overall unemployment falls below the economy's natural rate (NAIRU), wage inflation accelerates regardless of what headline CPI shows.

Assessing Manufacturing Capability

Gross Fixed Capital Formation (GFCF) as a share of GDP measures how fast a country builds factories and equipment. Higher GFCF means more capital per worker and higher future productivity, but capital alone faces diminishing returns. Countries where GFCF is accompanied by rising TFP have sustainable gains; those relying only on investment will plateau.

The Short List

The remaining candidates can be assessed through their unemployment dynamics, which signal whether today's wages will hold over a contract period. Vietnam (1.5% unemployment, 6.2% youth unemployment) and Thailand (0.8%, 4.5%) are both well below their natural rate of unemployment. At these levels, wage inflation accelerates regardless of headline CPI. Vietnam's ULC has already risen from 0.14 to 0.16 over the past decade, confirming this pressure. Cambodia (0.3% unemployment, 0.7% youth) has virtually no available workers at any age.

China (4.6% unemployment, 15.8% youth) has more slack, but its ULC of 0.24 is approaching the cutoff and its TFP has flatlined at 1.00, meaning productivity gains come entirely from capital accumulation rather than efficiency. Sri Lanka has the lowest ULC (0.040), but this reflects economic crisis: GDP contracted 7.3% in 2022, TFP collapsed to 0.91, and post hyperinflation deflation signals instability.

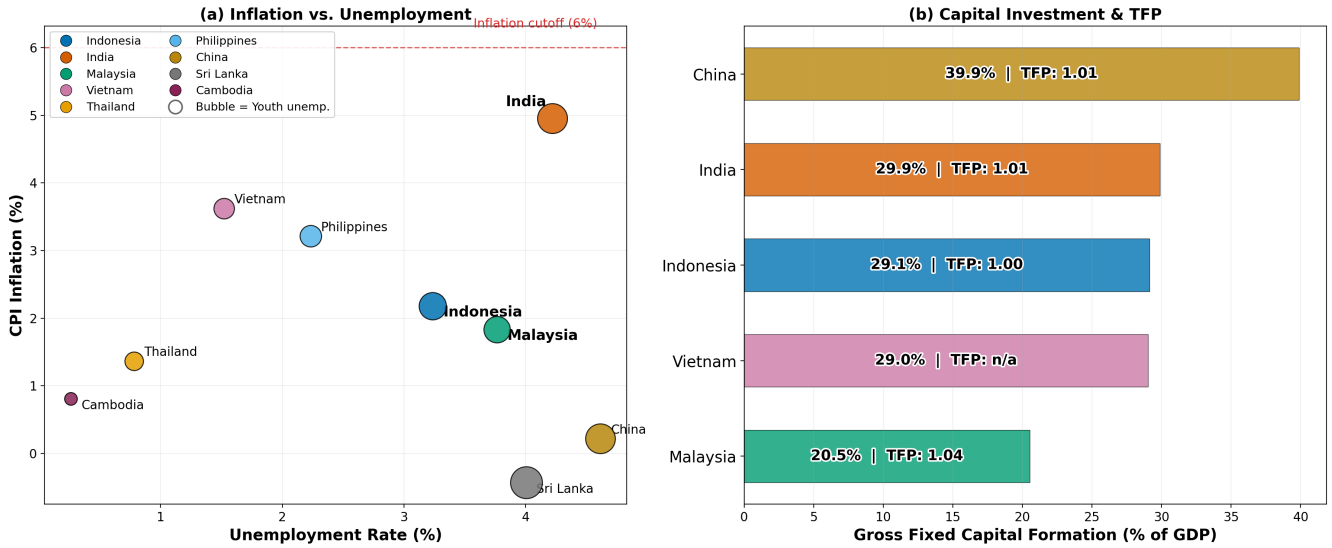

Figure 2: (a) Inflation vs. unemployment, bubble = youth unemployment. (b) Capital investment with TFP. Source: World Bank, ILO.

Why Indonesia, India, and Malaysia

Indonesia combines the third lowest manufacturing ULC (0.083) with inflation of just 2.2%, meaning costs take 32 years to double. Unemployment at 3.2% with 13% youth unemployment provides a moderate labor pipeline, and its 270 million population ensures this buffer is substantial in absolute terms. GFCF of 29.1% shows active capacity building. Indonesia does not win on any single metric, but it has no critical weakness.

India has the strongest labor pipeline of any major economy. Youth unemployment stands at 23%, meaning nearly one in four young Indians is actively looking for work. This represents tens of millions of potential manufacturing workers who can enter factory jobs without bidding up wages. India's TFP is rising (1.01, above the 2021 baseline), which means Indian manufacturers are becoming more efficient each year. Unlike China, where flat TFP means productivity gains require ever more capital investment, India's rising TFP allows it to absorb wage increases without raising unit costs. The weakness is manufacturing depth at 13% of GDP, meaning the supplier ecosystem needs development.

Malaysia has the highest TFP in the dataset (1.04), meaning it extracts more output from every combination of labor, capital, and technology than any other country analyzed. This is the Solow model's sustainable growth path: productivity driven by efficiency rather than capital accumulation alone. Malaysia also has the deepest manufacturing ecosystem among the three (23% of GDP), with precision capabilities in electronics and automotive that transfer directly to bicycle components. Its inflation of 1.8% is the most stable of any candidate. The tradeoff is cost: at $3.44/hr, Malaysia is three times more expensive than Indonesia or India per hour, though higher productivity partially offsets this.

A diversified approach, sourcing volume parts from Indonesia, building long term capacity in India, and using Malaysia for precision components, balances immediate cost with structural resilience. Each country addresses a different sourcing need, and together they reduce the risk of depending on any single labor market. Other factors such as trade policies, tariff agreements, international relations, and logistics infrastructure would further refine this recommendation but were outside the scope of this memo.

Sources: ILO ILOSTAT (manufacturing wages), World Bank (GDP, productivity, unemployment, inflation, GFCF), FRED/Penn World Tables (TFP). Full data in Appendix.

Appendix

Data Sources

- Manufacturing wages: ILO ILOSTAT, indicator EAR_4MTH_SEX_ECO_CUR_NB_A (ISIC Rev.4, Sector C, USD), `https://ilostat.ilo.org`
- Labor productivity: World Bank, indicator SL.GDP.PCAP.EM.KD, `https://api.worldbank.org`
- Manufacturing % GDP: World Bank, indicator NV.IND.MANF.ZS
- CPI Inflation: World Bank, indicator FP.CPI.TOTL.ZG
- Unemployment rate: World Bank/ILO, indicator SL.UEM.TOTL.ZS
- Labor force participation: World Bank/ILO, indicator SL.TLF.ACTI.ZS
- GFCF: World Bank, indicator NE.GDI.FTOT.ZS
- TFP: FRED / Penn World Tables 10.0, `https://fred.stlouisfed.org`

A1. Full Country Screening (Sorted by Manufacturing ULC)

Country	ULC (Mfg)	Mfg $/hr	Mfg % GDP	CPI %	Unemp %	Youth U %	GFCF %	TFP (2021=1)	Status
Sri Lanka	0.040	0.71	18	−0.4	4.0	18.6	22.7	0.91	Crisis instability
Georgia	0.063	1.65	8	1.1	12.1	30.3	23.1	–	Below mfg cutoff
Indonesia	**0.083**	**1.10**	**19**	**2.2**	**3.2**	**13.0**	**29.1**	**1.00**	**Selected #1**
Bangladesh	0.082	0.81	22	10.5	3.8	9.4	27.7	–	CPI > 6%
Pakistan	0.093	0.77	13	12.6	5.4	9.6	13.8	–	CPI > 6%
Turkey	0.098	4.31	17	58.5	8.5	16.0	29.6	–	Stagflation
Armenia	0.101	2.20	10	0.3	12.9	26.2	18.7	–	Structural unemployment
India	**0.103**	**1.19**	**13**	**5.0**	**4.2**	**16.0**	**29.9**	**1.01**	**Selected #2**
Malaysia	**0.118**	**3.44**	**23**	**1.8**	**3.8**	**12.0**	**20.5**	**1.04**	**Selected #3**
Saudi Arabia	0.123	8.63	16	1.7	3.0	10.0	27.3	–	Dual labor market
Kazakhstan	0.128	4.32	12	8.7	4.8	3.8	24.5	–	CPI > 6%
Jordan	0.136	2.63	18	1.6	16.5	38.9	22.3	–	Structural unemployment
Myanmar	0.141	0.89	23	8.8	3.0	9.8	–	–	CPI > 6%
Thailand	0.142	2.57	24	1.4	0.8	4.5	23.2	0.98	Low youth pipeline
Philippines	0.147	1.61	16	3.2	2.2	7.0	22.3	0.97	Viable alternative
Bahrain	0.152	7.11	20	0.9	1.1	5.4	20.1	–	High wage
Vietnam	0.160	1.97	24	3.6	1.5	6.2	30.0	–	Low youth pipeline
Singapore	0.195	20.71	16	2.4	2.8	6.8	25.7	1.01	Benchmark only
Uzbekistan	0.206	2.45	20	9.6	4.6	11.4	36.2	–	CPI > 6%
Kyrgyzstan	0.238	1.83	13	5.0	3.5	8.2	25.4	–	No mfg ecosystem
China	0.241	4.73	25	0.2	4.6	15.8	42.5	1.00	Eroding cost advantage
Cambodia	0.266	1.53	28	0.8	0.3	0.7	23.2	–	No youth pipeline

Table 1: Countries with ILO manufacturing wage data, sorted by ULC. TFP from Penn World Tables (2021=1.0); "–" = not available. Indonesia = primary. India = strategic. Malaysia = precision.

A2. Why Not the Other Shortlisted Countries

Country	ULC	Why Not Selected
Vietnam	0.160	1.5% unemployment, 6.2% youth unemployment: thin labor pipeline. ULC risen from 0.14 to 0.16 over past decade.
China	0.241	ULC near 0.25 cutoff. TFP flat at 1.00. Near zero CPI (0.2%) risks deflation. Cost advantage structurally eroding.
Thailand	0.142	0.8% unemployment, 4.5% youth: well below natural rate. Wage pressure building despite strong manufacturing (24%).
Philippines	0.147	Manufacturing at 16% is not deep. Overseas worker culture competes for manufacturing labor.
Sri Lanka	0.040	Crisis driven: GDP contracted 7.3% (2022), TFP collapsed to 0.91, post hyperinflation deflation.

Table 2: Exclusion rationale for shortlisted countries not selected.