

The three phases of Industrialisation

This essay suggests we can benefit by recognising three phases of industrialisation, how they morph over time and how they manifest and flow through the multiple sovereign states of a global economy.

What are the benefits?

By realising which industrial phase our economy is in, where it has come from and which phase it is likely to move to, this essay can show which parts of an economy are worth developing and investing in, and which parts are likely to wither and move elsewhere.

It can help nation states understand and reason whether they want to be self sufficient and own all economic areas, or whether they can be happy playing a role in a collaborative global economy that relies on others, and it can help to define what that role should be.

A global understanding and acceptance of industrial economy phase flows might reduce some of the energy sapping and sometimes gory economic competitions that consume the efforts of many of our species.

Context

Since the industrial revolution, centres of manufacturing have shifted globally to take advantage of resource availability, cheap labour, transportation routes, developing markets and accumulated wealth used for investment.

As robotics improve factory automation, our power to manufacture all manner of stuff has, and will inevitably continue to, increase beyond our capacity to use it, maintain it and deal with the waste at end of use.

A lack of 'whole system thinking' has resulted in our strained geopolitics between individual nation states, many of whom have been spooked by competitive fear and their own intrigue into trying to capture, or retain, a larger proportion of the means of production from which much wealth is derived.

This geopolitical strain results in a common set of problems we see today including tariffs, complex trade agreements, emigration, debt, disinformation, state disruption and theft,....and war.

This essay is an attempt to describe a whole system view, at a simple level, which might just help us reason about a better way of interacting economically.

Industrial phase model

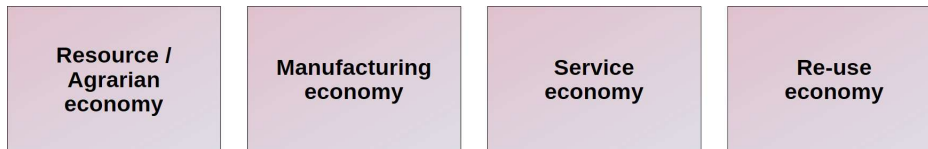
What follows is a simple model that is at best a suggestion of patterns based on recent observations, and you must test and judge it against your own models of reality.

The model can be summarised using a simple set of economy types and transitions between them, which can then be represented using state and state transition diagrams.

I shall briefly describe various economy types, bring a few into discussion scope, then reason about their transitions, before applying the model to a subset of nation states.

Economy types

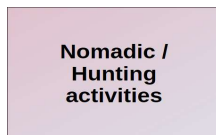
The economy types in scope of this document are:



We recognise that any of these economy types can transition into and out of other types such as:



But these are outside our scope, as are pre-agrarian activities such as:



and the imminent but yet to be realised



In scope:

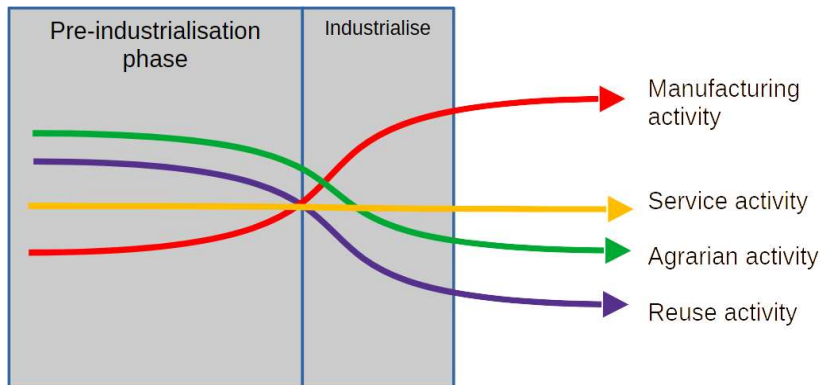
Economic type	Definition for this document
Resource / Agrarian	An economy predominantly based on exporting resources such as products from mining or agriculture.
Manufacturing	An economy predominantly based on manufacturing and the export of finished goods. Activities might include: Raw material processing and refining, fabrication, assembly.
Service	An economy predominantly based on services provided to people and organisations. Activities might include: Trading, research, media production, maintenance, banking, insurance, transport services, education, religion.
Re-use	An economy where a lot of resources are locked up in previously manufactured or imported goods, and which now has little manufacturing activity of its own. The words mend, repair, reuse, circular, disassemble and repurpose define it.

Some of these economic types appear to be recent. We might think that the manufacturing economies began with the industrial revolution, yet we describe antiquity in terms of stone, bronze and iron ages. Likewise, service economies such as silk road, spice routes, slave trading and the

knowledge economies that have supported religious organisations have all been recorded in many historical references, as have services based on art, music, philosophy, architecture and science. Re-use economies do not hold so much historical interest.

When we say a nation is in a particular economic state, we mean that one economic type predominates but others will be present to a smaller degree. Every economy will have elements of multiple economic types.

For instance



Pre-industrialisation phase

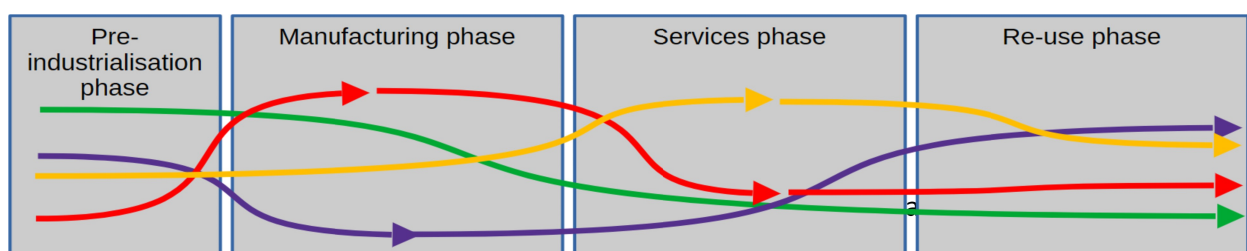
Initially, a few thousand years of evolution gave us hunter/gatherers who morphed into agrarian economies sprinkled with labour intensive manufacturing. A fair degree of re-use activities were also present as resources are scarce, and refined resources are even harder to come by. There are also service elements woven in to the economy that enable trade, social governance, education, entertainment and religion, all of which help to roughly define social groups within geographical boundaries.

Phase transition

This essay is particularly interested in transitions between economic types, their timing and sequence.

Economic type transitions take time. Maybe more than one lifetime, more than one government, more than one autocrat, and the nation itself, being fluid and only existing as a concept, may change its name, border, culture, religion and any other identifying thing that only exists because some of those-alive-at-the-time agreed that they do.

Consequently, this essay is painted with a broad brush, and to keep this short I am just going to jump in with a diagram that represents European economic transitions. Again, not to any scale. Then I will describe in simple terms the major drifts, then attempt to show how the diagram can be used to illustrate geopolitical drift.



Initially a predominantly resource/agrarian economic phase morphed into:

Manufacturing phase

The advent of complex tools and materials moved much economic activity into factories that manufactured all manner of stuff and exported it, sucking in raw materials from both internal and external economies. 'Industrialise' requires abundant cheap labour, which has historically been provided by slavery, immigration or relocation of land based serfs which eventually draws labour away from previous economic activities. The relative abundance of manufactured goods reduces the demand for re-use activity, and service activity gradually increases to deploy and maintain the manufactured asset base, and to soak up wealth created by manufacturing.

Services phase

As local wealth increases, labour expectations and costs rise, pushing manufacturers to seek out cheaper labour from improved tooling and immigration. Competition then forces a mass shift of manufacturing capability abroad to seek lower costs, and is replaced at home by a larger service economy that is generally higher paid, is environmentally cleaner with a population left wondering where all the heavy industries and their supply chains went. More attention is spent on health and well being. There is increased petty litigation over increasingly complex rules. Increased free time leads many to the fogs of inebriation and drugs as well as art, sport and polarisations around points of view. At this point, some nations have been tempted to fight against the natural progression to protect their higher cost manufacturing industries with subsidies, tariffs or onerous trade agreements. Which all add friction to our international interactions.

Reuse phase

This industrial phase is predicted as it does not yet exist, although 'advanced' economies are bumping up to it and attempting to avoid it.

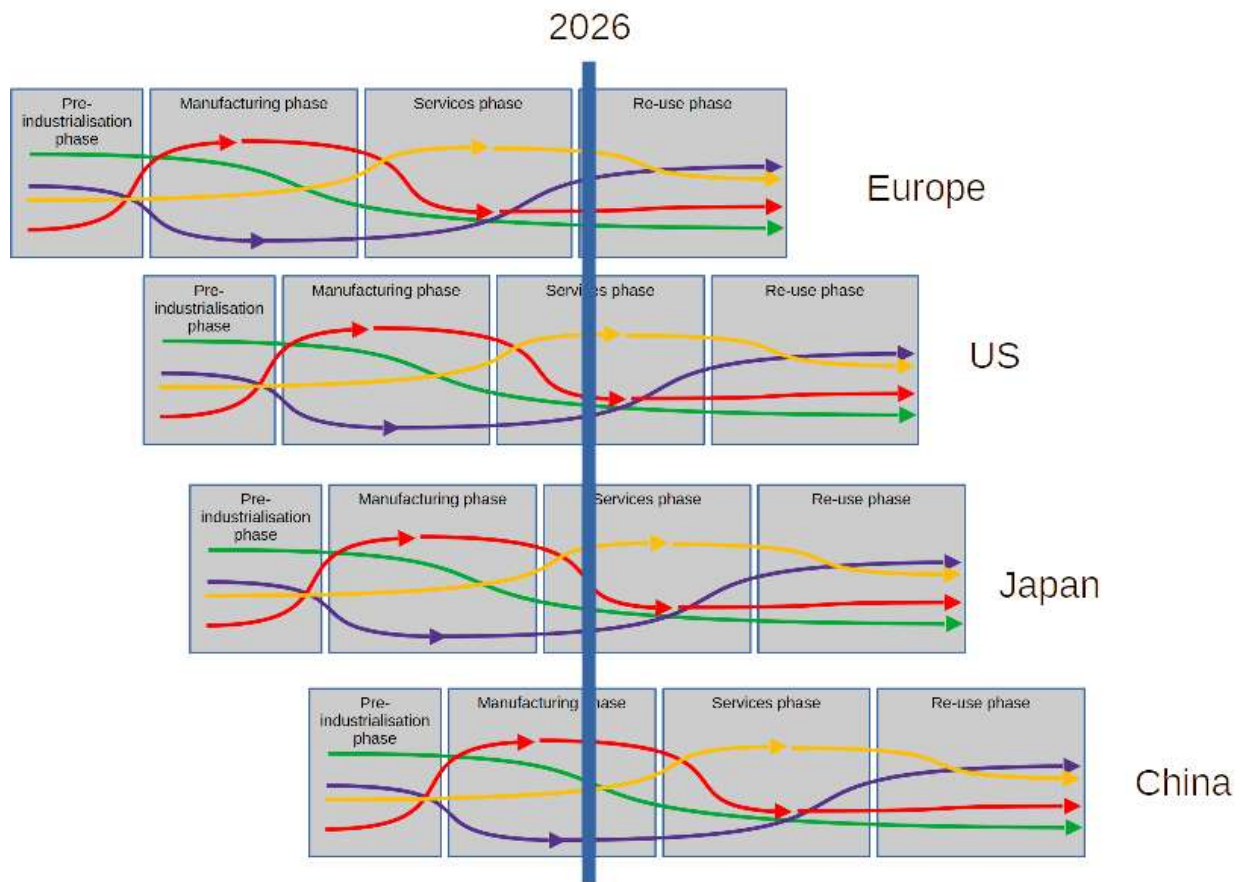
Other writers have already recorded thoughts on 'circular' economies, so I shall resist describing the ten thousand initiatives and businesses required to collect, sort, dismantle, separate and recast all the manufactured goods that we have broken or made obsolete, and then stored in lofts, garages and any hole in the round we can find so we do not have to be reminded of it.

Just think of the materials we have dug up, processed, transported and replanted. Mountains of waste pile higher; waterways, soil and air are contaminated with products that clean and polish and paint our manufactured items (and our bodies) in a vain attempt to hold back their deterioration.

Some nations may have tried to export their broken stuff to places with cheap labour - 'out of site out of mind' (a phrase which similarly applies to holes-in-the-ground, dumping-at-sea, and may well provide a significant use case for the upcoming space economy) but as most of this stuff requires technical innovation to process it, push back is inevitable.

Geopolitical transitions

Applying the model to a number of nation states could look something like the diagram below (again not to any scale and missing some obvious players)



Essentially, the phase flows of nation states are staggered, driven by cost of manufacture (labour and energy), investment opportunity and technology transfers. We cannot all be in a manufacturing phase at the same time without economic isolation.

Extending the model

This simple model could be extrapolated in a number of directions by asking questions about current geopolitical events and frictions, which readers may want to consider using their own mental models of reality.

Does a nation have to transition through the phases in the same order? No, many nations have not entered a manufacturing phase and may remain a trading or a resource economy, before developing into a service economy if they have acquired the wealth to import their manufactured goods.

Which economy types generate wealth?

- Agriculture, Mining and Manufacturing create things of value.

- Trading and other services allow wealth to flow. They predominantly slosh existing wealth around an economy, but they do enable value to be added, and wealth skimmed from the flows.
- Things created by Agriculture are destroyed by consumption, as are manufactured consumables.
- The value of all manufactured items eventually surrenders to rust, war or cultural and technical change.
- Reuse can restore value.

Which economy types improve the lives of citizens? Because manufacturing adds valuable assets, wealth inevitably flows to nations in a manufacturing phase. Whether it flows to workers depends on a number of factors:

- Historically, wealth has flowed into the hands of those who invested, yet increased wealth streams leak into supply chains to enrich service providers as well as managerial classes. Historically, factories have sought cheap labour to stay competitive, and when the pools of cheap labour, (mentioned above but add child labour and women), have dried up, then the leverage of limited labour supply can siphon wealth to workers, which raises costs which drives phase transition.
- Transitions are aided by wealth increases, as people start to look for easier work/life balance.
- Wealth transfer also depends on the governance system. It may be possible for governments to consume wealth through taxation or war, and this can suppress transitional forces but tends to result in oligarchies. Class or caste systems may be created to bake in cheap labour sources as can cultural alignment with working practices such as 996. Corruption and graft may also prevent wealth from improving citizens lives.

There is much that has already been written on the subject of spreading wealth within a society, so I will move on.

If a nation manufactures cheap labourers (robots that use AGI) can they develop a stranglehold on the means of production for the foreseeable future, or just delay the transition as the manufacture of such devices becomes cheaper elsewhere? Automation improvements which deliver cost reductions will probably delay phase transition, but there will always be cheaper labour elements elsewhere, so phase transition is likely to be inevitable unless automation development constantly reduces cost.

Can a nation resist transition flow, and defend their manufacturing industries through trade agreements, tariffs and sanctions? State sponsored and commercial IP theft is so prevalent that automation improvements will inevitably leak abroad, aided by demands for local manufacturing

centres that promote technology transfers. These national defensive tools just build geopolitical manufacturing competition and fracture global markets into national ones.

Defensive tools can sound good to citizens but they raise geopolitical frictions. Do they benefit local populations?

- Blocking cheaper goods can contribute to inflation and provides opportunities for those in the black market economy.
- Defensive tools can protect citizens by supporting higher standards of product safety and quality, but resources are required to actively monitor and control imports.
- Supporting domestic inefficient businesses could lead to lack of productivity investment.

If nations accepted transitional flow would this reduce international conflict and trade complexity?

- A manufacturing economy can wage war better than any other economic type. Many wars have been caused by the disparity between manufacturing capabilities, and it is always tempting to take advantage of the contrast with neighbouring economies.
- If we want to reduce our conflict footprint, then we must start to understand the benefits of allowing economic transitions to flow globally and not become so selfish in our desire to better ourselves at the expense of others.
- Accepting flow could definitely reduce the trade complexities of tariffs and other economic toys that are used to defend industries from cheaper global manufacturers, but it would probably not reduce other behaviours that lead to war.

Where is the re-use economy? Understanding and accepting the basic economic transitions described here should help service economies envision, then invest in the poorly represented re-use economy. This would likely free up the whole phase transition cycle to deliver global benefits.

What now?

If we think globally and from a species point of view, we should be encouraging these transitions as they gradually raise living standards around the globe, not all at the same time, but incrementally. A sort of multi generational carrousel of levelling up. If they were encouraged, global economic activity could be loosened by removing trade barriers and to reduce costs across most industries. Governance systems could spend less time on litigation and mediation and incessant trade negotiations and put more focus on delivering benefit to citizens.

This is just one more instance where global system thinking could benefit our species.

Unfortunately, many of us do seem to love complexity and conflict – maybe that has to change first. All it takes is one major defensive player for the whole system to become competitive.