RESHAPING THE SA ECONOMY

ACCELERATED INDUSTRIAL TRANSFORMATION

LANCE WORRALL

What does losing the automotive industry mean to South Australia, and to the nation? What do we lose when we lose complex auto manufacturing? What are the consequences?

What will be lost, unless there is dramatic action, is not ‘only’ the capability to manufacture and build cars, but our largest, most sophisticated complex manufacturing value chain. This industry has been essential to a wide range of other critical knowledge intensive manufacturing and engineering activities – ones that are essential to our being part of the international knowledge economy.

And this is precisely what is at stake here – our ability to be part of the global knowledge economy.

It is true that over the past decade or so, Australia has been on a treadmill of producing cars with progressively fewer Australian workers and lower and lower Australian manufactured content, at the cost of public budgetary assistance. Over that period, we went from producing 400,000 units a year to half that number.

That is not to say that assistance was unjustified; far from it. But it needed to target actively and progressively building and transitioning manufacturing capacity and capabilities to
opportunities outside automotive, as well as sustaining automotive production itself.

That assistance should not have been seen as just about building cars, but also about providing time to gather together, and hold within Australia, the key capabilities auto manufacturing has imparted to us, and then applying these capabilities to new manufacturing opportunities, because the alternative is losing them forever.

Until last year, many of us with that perspective hoped we might buy half a dozen or so years to work on the transition; now we have less than half that time.

In other words, the policy framework we should have had, and now need desperately, is one about diversification and accelerated movement into new manufacturing.

This means having active government and active strategy for industrial diversification - broadly speaking, the kind of approach adopted by successful, high innovation industrial nations from Taiwan to Germany, from Japan to Scandinavia, from Singapore to Switzerland.

The consequences will be dire unless there is a transition plan to accelerate development of ‘new manufacturing’ – about which I’ll talk later – to retain at least some of the capabilities associated with the car industry – and to make up for at least part of what we are about to lose.
Unless Australia takes urgent action to diversify and transform its manufacturing, the Nation faces the permanent loss of essential economic capabilities and, with that, may I stress, **reduced capacity** to develop new ones in the future. The consequences of that deindustrialisation would include:

- Dependence on fewer, and lower value adding, industries
- Greater vulnerability to external shocks, such as currency devaluation, which seems likely over coming years, and
- A weaker, more narrowly-based and more exposed Australian economy, one more vulnerable to those international shocks. A significant devaluation of the dollar without strong manufacturing means a tighter balance of payments constraint, which means the solution to external imbalance will have to be reduced living standards through higher unemployment.

These are unacceptable costs for society.

The deindustrialisation of which I speak is virtually synonymous with the deskilling of the national economy and, because of the path-dependent nature of complex manufacturing, skills lost now will be either impossible or prohibitively expensive to replace later, as I have been at pains to emphasise.
Now if you prefer a less gloomy outlook, you can just go to the policy orthodoxy and its Computerised General Equilibrium (CGE) models. These say that the demise of the automotive industry is, in fact, a good thing, because it means we are approaching an optimal allocation of our resources to their highest, most productive use, in line with our comparative advantage. Australia’s GDP will be higher because, in the new equilibrium, resources will be directed towards higher productivity uses.

There are two things wrong with this. First, the theory and model are only as good as their assumptions, particularly when dealing with the death of a whole industry. The assumptions do not pass real world tests. These include assumptions of:

- Exclusive role of prices in information flows
  - And not only that, but there is also perfect knowledge of all relevant prices by all agents, with perfect foresight to eternity
- Perfect competition
- Full employment of workers and capital, such that affected workers will only be unemployed for a short period, or else, where workers are unemployed for long periods, it is voluntary unemployment, their having decided to take an extended, no-frills holiday in Northern or Southern Adelaide
The exchange rate, wages and relative prices adjust quickly to allow ‘market clearing’
This allows expanding sectors to absorb the displaced labour quickly, and
The new higher productivity equilibrium arrives quickly. There are no significant gaps or delays.

In other words, the problems are dealt with by assuming them away.

Second, this view flies in the face of what we know about innovation and the strategic importance of manufacturing to the knowledge economy. That is, in advanced economies, manufacturing

- Drives innovation and productivity growth
- Is the biggest spender on R&D
- Drives high value services
- Has high multipliers through linkages to other sectors,
  and
- As the largest component of world trade, it drives and causes ever-increasing specialisation and sophistication and value chain complexity.

I want to dwell on this last point, because it’s fundamental to what follows. Manufacturing trade grows more quickly than total manufacturing output. So trade in intermediate manufactures (as distinct from finished goods) has been rising over decades. This points to the ever-increasing specialisation, interdependency
and complexity of international manufacturing supply chains.

The truth is that if you want to be part of the international knowledge economy, manufacturing is not optional, it is mandatory. Manufacturing is central to complexity which is what I’ll talk about now.

Recent research has confirmed that ‘economic complexity’ (meaning an ever-deepening division of labour and specialisation, and intensified application of knowledge) is what explains differences in countries’ performance and prosperity. Further, this study by the two MIT scholars Hidalgo and Haussmann, The Atlas of Economic Complexity: Mapping Paths to Prosperity, underlines the centrality of advanced manufacturing to achieving this economic complexity. The colour-coded map of the earth you see here presents their conclusions about differences in levels of economic complexity between nations.

I cannot go into great detail here on complexity. Their book is available free on the net.

Regardless of acknowledged limitations, their work is a significant longitudinal comparative study, and is a living model that will be refined in years to come. I stress, it is not the latest fad.

Their approach stands in a line with the work of others, such as Michael Storper on ‘Trade and Product Based
Technological Learning’ (the young Michael Storper I am told), or Nobel Prize winner Paul Krugman, on increasing returns to scale and the role of intra-industry trade, or Cambridge economist Nickolas Kaldor on cumulative causation, and his brilliant writings from the 1950s through to the 1970s.

But, just quickly, complexity is held to be the key driver of differences of income per capita between countries, predictive of a country’s future growth, and the complexity of its exports. Economic complexity could also be called network richness. It is about how societies amass knowledge certainly, but also about how they utilise and mobilise productive knowledge. It’s not the level of knowledge in a society that matters most, but how it is organised through increasing specialisation, value chains, and division of labour, and then mobilised, through markets, firms and institutions.

Products embody knowledge, so we can say: “what a country makes is what it knows”. Sophisticated products reflect high and diverse capabilities in local value chains – ‘economic complexity’. And, be it noted, much of this knowledge is tacit, bound up in institutions and networks, rather than always being formal and codified.

The authors extend this line of thinking by the concept of ‘diversity’. Countries with diverse products have a wide variety of capabilities present within them, and are likely to have a large portfolio of sophisticated products. A country
exhibiting diversity in its products has a large amount of embedded knowledge and a sophisticated array of capabilities: it can do many things. Less diversity indicates the reverse.

Again, their aphorism is powerful and worth remembering: “what a country makes is what it knows”.

Now to Australia’s position, and the map of the world on screen. Hidalgo and Haussmann have analysed and ranked 128 countries in a longitudinal study commencing in 1964 and concluding in 2008.

- Australia’s economic complexity has fallen dramatically:
  - 2008 ranking is 79, below Trinidad and Tobago, Mauritius, and Chile, and ahead of Zimbabwe, Jamaica, and Pakistan. Australia’s complexity rating is -0.321, compared to Japan (2.316), Germany (1.985) at the top of the list, Singapore at number seven (1.639), and the USA at 13 (1.447), China at 29 (0.894), Thailand at 31 (0.814), and Malaysia at 34 (0.759).
  - Australia’s ‘economic complexity’ has deteriorated since the middle 1960s, with a dramatic deterioration of -0.50 over the 1998-2008 decade, the period during which our exports came to be dominated by coal, iron ore, other minerals and liquefied hydrocarbons, and manufacturing’s GDP share fell dramatically.
Automotive manufacturing is industrial complexity par excellence. But as a small high cost economy, Australia cannot be competitive in mass scale-based manufacturing, such as cars. We cannot be competitive where the basis of competition is scale and unit cost. We have to face this. We know this.

However, changes in technology and international supply chains (exhibiting increasing complexity and international interdependency), together with new innovative business organisation, have opened up opportunities for competitive new manufacturing. These changes mean that often, being small is not a disadvantage, with such manufacturing typically based on short runs, high variability, and rapidity to market, high value and medium to high complexity. These developments have opened up opportunities for small and medium enterprises, and clusters of SMEs in global supply chains.

This is called **new manufacturing**.

The challenge, then, is to use the capabilities we still have, build on them, and find opportunities in new manufacturing and new value chains. We need to build complexity and move up the value chain.

**This is path-dependent.** In other words, whilst you can certainly slip and lose complexity massively, as Australia has, complexity-building has to take place in stages. You can certainly go down the ladder fast, but you can only go up one
step at a time. You cannot leapfrog from basic commodity producer to leading semi-conductor manufacturer in a decade.

So, a nation or region needs to build on what capacities and abilities it has, targeting products close to the current set (‘near-by’ products, as Hidalgo and Haussmann call them), and addressing capability gaps to move up the value chain progressively. By building on existing strengths, you can make a transition from old to new. But you must translate and transform on the basis of what you have already.

This has been Singapore’s explicit approach for decades.

Work is being done presently at DMITRE, WISER and the Stretton Centre to identify value chain opportunities for such translation. The work on industrial diversification opportunities in Northern Adelaide have indicated prime facie opportunities in:

- selected defence (armed vehicles fit-out and through-life support; the Future Submarine project, amongst others)
- sophisticated manufacturing inputs to selected resources and energy areas (copper and complex combined ore bodies; unconventional gas)
- assistive technologies for the aged and disabled
- medical devices, and
- clean technologies.
The first cab off the rank here has been an opportunities mapping project focussed on assistive technologies for the aged and disabled, in partnership with DMITRE and Fraunhofer Gesellschaft, Germany. We know about population ageing and that disability rates rise in tandem with it. We know rising demand for assistive technologies will come from this, but it will also come from the rapid rate of technological change and development of new products, which also creates its own demand. Fraunhofer has described assistive technologies as the ‘next automotive industry’ for them.

We also know assistive technologies at the medium to high complexity end have ‘new manufacturing’ characteristics such as high variability and customisation, and high value. Further, the technical characteristics of many assistive technology segments do not require large scale production, and use of new technology applications, such as additive and subtractive manufacturing, will reinforce the ability of smaller firms to be competitive internationally. They often require strong, light new materials like titanium, where we should be able to build competitive advantage.

What are the opportunities for our manufacturers to participate in this growth? The project is about finding the answer. It requires a methodical approach, which arrives at what we call a ‘demand/supply/capability matrix’ to identify
high value industry development opportunities for us over the medium and long terms.

**NEXT SLIDE**

**First step:** Analysing domestic and international demand by key product/market segments, over the next 10 years.

**Second step:** Working with local companies to analyse their existing capabilities, against what they need to be, to be competitive in particular parts of the Assistive Technologies value chain.

**Third step:** Narrowing the range of products in scope on the basis of an understanding of what local industry capabilities are or could be – remember we are targeting ‘near-by’ products.

**Fourth step:** Targeting gaps in company capability and capacity, pinpointing where individual companies need to acquire new capabilities or otherwise improve, to capture the prime facie opportunities that we identified in step three.

**Fifth step:** Taking stock and a reality check on the information gathered to create a demand/supply/capability matrix – a hierarchy of the half dozen highest value, credible and actionable industry development opportunities, that have been distilled through this iterative process.

These are the basic steps. In reality, there may be more, because the process needs to be a very iterative one. It can be likened to a funnel, progressively going from broad brush opportunity assessment, comparing that to local industry capability to narrow the focus, then gaining a more detailed
practical understanding to arrive at a schedule of opportunities that are actionable and credible, as well as high value and high impact.

This opportunity and value chain mapping approach will be applied not only to medical and assistive technologies but to all the other target value chains.

Because it focuses on rapid identification of alternative products aligned to existing or near-by capabilities of South Australian companies, it is well suited to our task of rapid industrial transformation.