Swinburne University of Technology

Submission to the Productivity Commission Review of the Australian automotive manufacturing industry

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Overview

Swinburne University of Technology (Swinburne, the University) is pleased to make this submission to the Productivity Commission's inquiry (the Inquiry) into public support for Australia's automotive manufacturing industry.

The challenges facing the Australian automotive manufacturing sector are well documented. As the cross-linking between supply chains (eg. aerospace and automotive) increases in the pursuit of innovation, diversification, productivity and effectiveness, global competition will continue to intensify. The future of Australia's automotive manufacturing industry should be seen within this larger context: multi-level and multi-functional access to, if not control of, global supply chains is currently at stake for Australia.

For Australian manufacturers to continue to prosperously participate in this global environment, the ongoing improvement or transformation of existing capabilities, as well as the development of new capabilities are salient issues. Australia has unique intellectual and physical capabilities (eg: steel, lightweight, precious and rare metals) that can indeed position it as a major player in future mega supply chains of the mobility industry. However this will only be achieved through the adoption of new manufacturing paradigms, and the development of innovative business and collaboration models.

Swinburne shares the Australian Government's desire, as expressed in the Scope of the Inquiry, for "an internationally competitive and globally integrated automotive manufacturing sector" in the context of improving the "overall performance of the Australian economy", and appreciates the opportunity to contribute to this important review.

About Swinburne

Swinburne's 2020 vision is to be Australia's leading university for science, technology and innovation. With a unique combination of strengths that spans vocational education, higher education and research, Swinburne aims to make a difference in the lives of individuals and contributes to national economic and social objectives.

Swinburne continues to be ranked as one of the world's top 400 research universities (based on the Academic Ranking of World Universities 2013), and in the top 100 for physics. Swinburne has a strong commitment to the advanced manufacturing sector, including exploring new opportunities for the automotive industry, such as design led innovation, lightweight materials and electric vehicles.

Swinburne's Electric Vehicle Research Group is one of the leading groups in the world in electric vehicle research, development, policy and education. Electric vehicle research is multi-disciplinary and covers broad and complex issues across mechanical engineering, electrical engineering, robotics and mechatronics, as well as information and communications technologies.

Introduction

Profile of the automotive industry

The international automotive industry has undergone dramatic changes in the last 20 years. Annual production volumes for passenger cars and light trucks have increased from 48 million in 1994 to over 84 million in 2013[i]. The leading automotive producing nations have shifted from USA to Japan and more recently to China. In 2013, just four of the 42 automotive producing countries—China, the United States, Japan, and Germany—produced 53 percent of all light vehicles worldwide, and the top 10 accounted for 76 percent. At 18.2 million vehicles, China produced almost as many as the next two countries—the United States and Japan—combined. Germany's and South Korea's production is declining slightly, while that of India, Brazil, Mexico, Canada, and Thailand is gaining.[ii] An estimated 1 billion vehicles are in the current global fleet with net increase of approximately 40 million vehicles added annually.[iii]

Value proposition of the Australian automotive manufacturing sector

It is widely acknowledged that the automotive manufacturing industry- and indeed passenger vehicles themselves- impact in both positive and negative ways on the Australian economy and community. Positive contributions include large scale economic activity, employment, a highly skilled labour force and technologies that have benefited almost all other industries via at least the value of transport alone. Negative aspects include pollution, inefficient consumption of limited resources, poor urban planning and a culture that has become dependent on the car. Personal mobility will remain a major theme for public policy makers of the future.

As reflected by the Terms of Reference, automotive industry policy is at a crossroads; how should the Australian automotive industry be supported so that it may prevail? Or should our auto industry be allowed to survive only if it is fit enough to do so? There is an alternative view that covers both positions. It is via enabling a diversification strategy that will help the Australian automotive industry evolve into something that is robust and suited to our needs.

The Australian automotive industry sits in the bottom quartile of automotive producing nations, number 31 of the 42.[iv] It is a small player on the global scale yet it contributes $21.5 billion in annual economic returns according to a report recently released by the Federal Chamber of Automotive Industries[v]. This equates to approximately a $934 benefit to each person in our 23 million population.

The Government currently provides approximately $500 million per annum in funding to the Australian Automotive Industry; roughly $22 per person. That equates to a 42 times return on investment. While this is a simplistic calculation, the debate over whether the Government should continue to allocate tax payers' money to supporting the automotive industry needs to consider the economy wide impacts of this support.

The 2008 report by the Hon Steve Bracks (Review of Australia's Automotive Industry[vi]) included recommendations for incentives to transition the industry to a more globally competitive condition with a focus on supporting innovation and R&D, addressing issues of emissions, energy efficiency and related technologies. It also recommended a further reduction on tariffs to 5 percent by 2010 and expansion of free trade agreements in the Gulf States, the Association of South East Asian Nations and South Africa, as well as a revision to nationally harmonise taxes, duties and fees associated with passenger vehicles. It was hoped that this would provide the targeted support to enable either diversification away from the auto industry and/or engender new competiveness through technologies relevant to the issues of energy, environment and economy.

What is Australia's advantage?

There are many factors which determine the feasibility and competitiveness of a continued automotive manufacturing industry. A leading factor, cost, however is based on the locally achievable scale of economies compared with the global automotive leaders China, USA, Japan, Korea and Germany. If economies of scale are our major disadvantage, a logical question is "what is unique to Australia" that may be used to our advantage? The mining sector is strong and Australia is well known in having large mineral resources. Australia has high standards of education and a highly skilled workforce as well as a reputation for high levels of innovation. These qualities may be better applied to address issues of competitiveness and low economies of scale in the automotive industry.

Understanding the Problem

Competitive opportunity

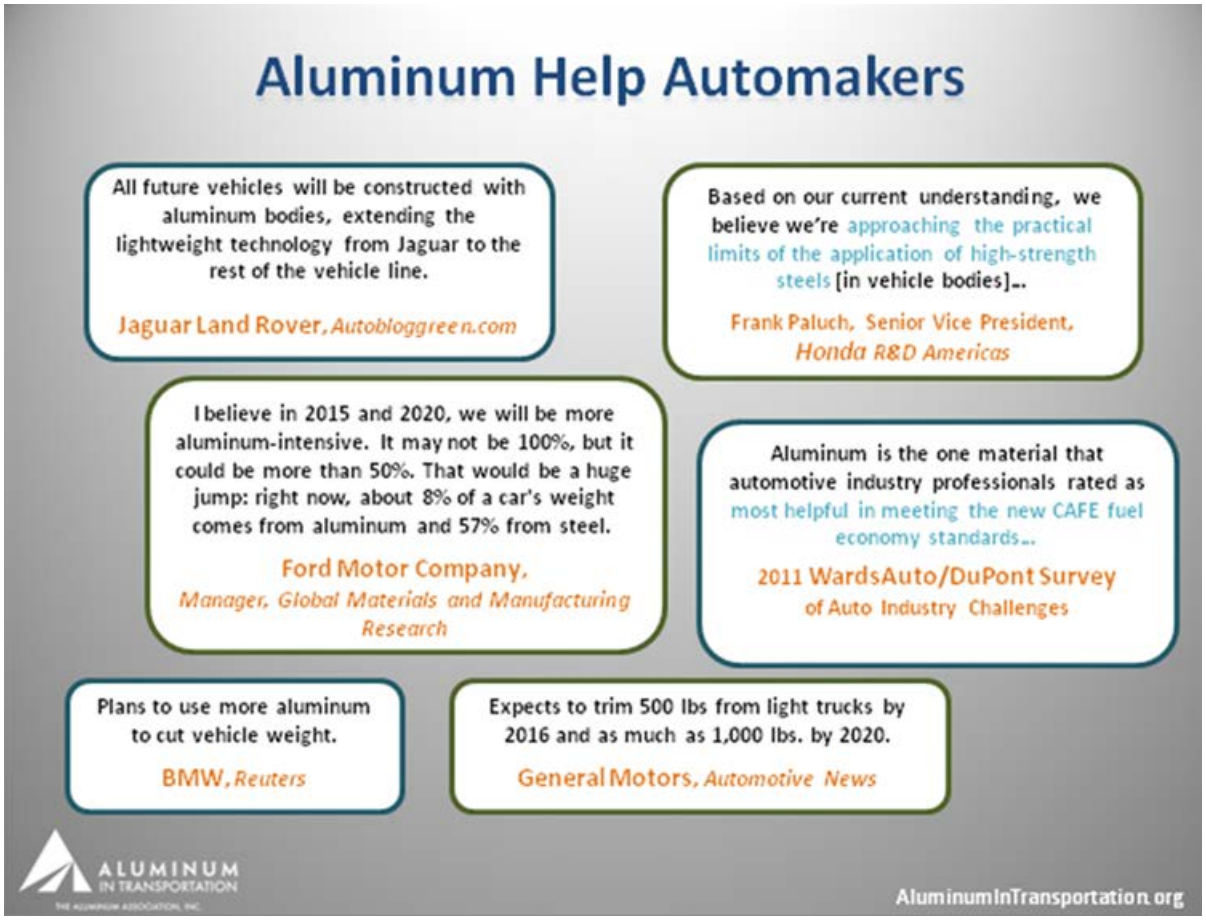
In the simplest terms, competitiveness from the supplier's perspective may be defined as the difference between the cost and perceived value of a product or service. In the Australian automotive industry, intense emphasis is placed on cost as the primary factor for competitiveness. For suppliers in the automotive sector, meeting the value expectations - requirements and quality standards – is not negotiable, therefore the only lever is price.

It is well known that any business that competes solely on cost will be driven into the commodity corner and become uncompetitive as the substitute products and services enter the market and undercut each other on price until profitability gets squeezed to impossible lows. This includes imported products and offshore outsourced services. The commodity corner is simply illustrated on a matrix, with value on one axis and price on the other. The low price – low value quadrant represents the commodity corner. Luxury goods would occupy the high price – high value quadrant. The other two quadrants represent anomalies of either overstated value or unrealised price.

The final quadrant, unrealised price, is the ideal position to be in terms of competitiveness. This position is defined by added value and is often achieved via innovative features and technology in the product or service. In other words, product differentiation and market awareness underpin competitiveness.

An example of unrealised price that is sadly a lost opportunity for Australia relates to the Aluminium industry with the looming closure of smelters. In contrast, the explosive growth in applications of aluminium

in the automotive industry has spurred major investments in value-add aluminium production facilities in other high wage countries. (e.g. for aluminium sheet products in the USA by Alcoa and Novelis)[vii]



Economies of scale in a global industry

Economies of scale enable a proportionate saving in cost by an increased level of production from a given investment in capital and resources. The practices of lean manufacturing are aimed at increasing efficiency and a major aspect of that is via economies of scale. However this has led to an overemphasis on reducing cost, standardisation and platform design philosophies over product differentiation and market awareness. Whilst these practices create advantage via increased economies of scale in the global market, they place repressing constraints on the freedom to compete with innovative designs and technology. This is particularly true if you are a "build to print" supplier as there is little to no room for competitiveness based on exclusive product technology when the original equipment manufacturers (OEMs) insist on freedom to source globally.

Global industry dynamics

Compounding these problems is the fact that the Australian based OEMs are foreign owned and often prefer to do the expensive technology development in their home territory. Another significant factor is high degree of risk aversion in the automotive industry. Technically complex product systems are required to be extensively field validated before they will be considered in a new vehicle program.

Under these circumstances the suppliers tend to focus on cost reduction via incremental advances in lean production technology and superior quality delivery to stay competitive. Added to the risk of R&D is the fact that the lifespan of any product technology advantage in the global market is quickly overcome by fast follower strategies coming predominantly from China[viii]. However given enough time China is also susceptible to being stuck in a commodity corner. As with Japan in the late 1970's, it is expected that China will eventually transform to an innovation leadership strategy.

International trade dynamics

Many of the reports and responses from automotive industry representatives refer to claims of a non-level playing field based on low tariffs, unfair foreign trade agreements, high labour rates and unfavourable currency exchange rates[ix]. Further, the leading auto producing nations provide significantly higher government subsidies[x] compared to Australia. Reintroducing tariffs has been widely dismissed by Government agencies based on the concerns of trade reprisals[xi] and criticism that tariffs prolong inefficient practices.

However the reality is that the leading automotive producing nations (China, Japan, Korea and USA) have significant tariff and non-tariff trade barriers in place. If there is no level playing field, but the dynamics of international trade are unlikely to change, the Australian auto industry needs to reposition itself around effective cost leadership, product differentiation and market focus – arguably the three most important factors of competitiveness.[xii]

Devising a Solution

Strengths unique to Australia

In considering proposed solutions to the problems we should ask: what gives the leading auto producing countries their competitive advantage and is it feasible for Australia to compete on those terms? What does Australia have as a unique advantage and how can we leverage that? Can we reconfigure and reposition an Australian automotive industry to thrive based on small scale operations, high technology and an ability to defy any fast follower strategy?

Australia is well known for having vast mineral wealth, particularly in iron ore, bauxite and other important metal ores such as lead, zinc, silver, gold, nickel, copper, lithium, magnesium and titanium. Other strengths include high levels of technical capability in all stages of the tangible value stream from minerals processing, materials development through to manufacturing operations. We also have considerable skills in high quality education, research and development, advanced product design and development and digital communications. Australia is one of the few nations in the world capable of designing and developing a complete passenger vehicle from concept to commercialisation.

Australia has a world class engineering and R&D network to support quite a varied range of businesses. These are being actively sought by global systems integrators, as demonstrated by recent high level executive visits from the US management of companies such as Ford or Lockheed Martin.

A broad-based solution

A well-considered solution to the problem of an ailing automotive industry should capture the broadest level of the unique strengths offered by the Australian context, tying access to raw materials with advanced materials application, full design and development capability and a robust agile manufacturing capability.

There is no need to be segregated and locked into exclusively manufacturing for the automotive industry. The manufacturing industry should turn its economies of scale weakness into its strength. New applications of lightweight high strength alloys using advanced rapid manufacturing techniques and advanced design methods utilising artificially intelligent systems may enable production of components, sub-systems and final assemblies to be manufactured in small scale operations in localised regions. Equally, existing automotive technologies, particularly those associated with electric vehicles, can be used to create new product categories, such as personal lightweight electric aircraft and purpose designed delivery vehicles.

The cars of tomorrow will be energy efficient, recyclable, clean and green, and cellular (connected). Australia has the capabilities to make such cars, at least for its own domestic market. A unique and affordable design will then take it to the world stage, through strategically positioned distributed, scalable manufacturing, and by targeting the expanding middle class markets in the Asia-Pacific.

The factors of distance (freight), population density (market size) and diversity (scale) raise tough challenges for Australia's SMEs. Innovative business models are therefore needed, for instance based on strategies with some or all of the following complementary features:

- smart engineering and streamlined operations to minimise capital expenditure
- focus on material systems that are impossible or costly to process in conventional facilities
- emphasis on new materials and emerging ICT-rich market applications
- remote diagnosis and rapid after-market services.

Distributed manufacturing model

The ability to do this requires the freedom to determine and manage the platform technology, service and product architecture. Consumer goods, medical equipment, specialised services and customised product systems may all be facilitated by a complimentary strategy – distributed manufacturing[xiii]. The concept of distributed manufacturing is all about having concurrent resources available in small efficient operations located where there is a need and a market. The output and scale is determined by the customer demand in location hence a new perspective on what it means to be lean is realised.

The ability to be creative and responsive is greatly enhanced by this strategy. Fast followers no longer have an advantage and technology development is accelerated by the concept of open innovation[xiv] and collaborative design.

Megatrends

The CSIRO published a revised report in 2012 "Our Future World – Global megatrends that will change the way we live".[xv] The six mega trends outlined in the report cover 1) limited resources, 2) environmental degradation and biodiversity, 3) economic power shifting to the Asian region, 4) the aging population, 5) digital connectivity, and 6) changing expectations away from products to experiences and social relationships. These megatrends may equally be considered in the context of economy, energy, and environment as outlined by Chris Martenson in his book "Crash Course".[xvi] Both these reports highlight the urgent need to address energy efficiency and our impact on the environment with a tangible form of currency. Any manufacturing strategy adopted by Australia, or any nation for that matter, must be prepared for these impacts to hit hard in the next 5 – 15 years.

Improved integration of research organisations and industry

Another vitally important factor affecting the productivity and independence of our nation is the level and diversity of skills in our labour force. An equally important factor in a proposed solution is improved integration between education, R&D organisations and industry. Small to medium enterprises in particular often struggle to commercialise or adopt new technologies that would allow them to diversify their product range.

International examples of closer collaboration between researchers and industry, such as the Fraunhofer Society in Germany, are ideal in that their business model earns approximately 70% of its income through contracts with industry or specific government projects. The other 30% of the budget is sourced in the proportion 9:1 from federal and state government grants and is used to support preparatory research. This provides German industry with a powerhouse of applied research capability.

Recommendations

Swinburne has developed three recommendations that can be incorporated into future automotive policy settings to ensure that industry assistance drives the transformation needed to ensure the longer term survival of automotive manufacturing in Australia.

Recommendation 1: enable distributed and CKD manufacturing models, with local ownership

A logical recommendation, based on the finding of the Bracks Report issued in 2008, would be continued Government support for a diversification strategy. However a more future focused approach is needed that takes into consideration and facilitates building the capabilities required to enable distributed manufacturing. This would include supporting proposals to facilitate investment in assets for flexible and rapid manufacturing systems and government funding capability mapping using the new filter of distributed manufacturing. Manufacturers that had been dedicated to automotive supply would be encouraged to develop business capability for other industries (eg: medical equipment, robotics, building, defence, aerospace and mining).

To maintain a stable foundation of employment in the automotive industry, the transition to complete knock-down kit[xvii] (CKD) production should be supported. (eg: from 2014 – 2020). This may be initially developed with the existing OEMs (Ford, Holden and Toyota) however further incentives may be proposed to encourage other leading marques such as BMW, Mercedes, Audi, VW, Renault, Tata-Jaguar and Tesla to assemble their vehicles in Australia, providing the opportunity to apply local content to the vehicles and re-build capability where it no longer exists. In addition, the capability to support the aftermarket with locally manufactured replacement parts should be developed. While the Australian Government continues to comply with World Trade Organisation guidelines, bold proposals adopted in other jurisdictions (eg: the USA) entail a mandatory level of local content / localised assembly once a certain volume of sales is exceeded. This has the added benefit of helping to offset currency fluctuations.

With Government assistance, a locally managed and locally owned design and development agency could develop a vehicle platform based on collaborative design and open innovations principals. This vehicle may be purposely designed to facilitate small scale distributed manufacturing whereby the customised vehicle is assembled at or nearby the point of sale.

Similar to a franchise business model, the vehicle would be based on a modular assembly system with the freedom to customise non-safety related features of the vehicle such as interior and exterior trim and body parts. Supplier businesses with approved capability may subscribe to the franchise to manufacture in a geographic zone, localised at potentially the suburb level. A similar example of this concept is the Magna Styer Mila[xviii].

Supporting a concept for low emission and sustainability, the proposal would include a modular alternative fuel (eg: electric, hybrid, gaseous fuel) vehicle system that may be upgraded re-furbished and re-configured (re-purposed) for an extended lifecycle rather than being scrapped, partly recycled and/or sent to landfill.

Recommendation 2: develop niche applications based on local advantages

To build technological competitiveness in the local industry, specialised knowledge and skills in lightweight metals production and application could be nurtured and developed for niche applications such as advanced integrated modular vehicle chassis systems.

The objective is to capture more of the upstream value chain, utilising more Australian sourced raw material and manufacturing stock. Australia has unique capabilities in both raw materials and technologies that can position it as a major player in future mega supply chains for not only the automotive industry but wider applications in related sectors such as aerospace, military, civil, whitegoods and the health industry. A greater degree of vertical integration in Australia will help protect skills diversification and will insulate the economy from fluctuations in the foreign exchange rates.

Recommendation 3: support closer collaboration between research and industry sectors

Closer integration between education and R&D organisations and industry would help build the productivity and skill relevance in the Australian economy. This definition of industry needs to include Finance and Management. The training, education and development of Australia's future entrepreneurs are also vital to a vibrant and innovative nation that is known for its resilience and resourcefulness.

Consideration should be given to re-emphasising industry based funding with government support, rather than some of the existing grant schemes which have features that are unappealing to industry. This could be addressed by a program supporting industry based research engineers, PhD positions, post graduate and undergraduate cadetships formally recognised and endorsed by the Government. Further, a Government subsidised R&D consultancy service (similar to the Fraunhofer example) should be encouraged to help realise a technically rich and prosperous future Australia.

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