Market Trends and Skills Development Needs in The Automotive Industry

Australia Malaysia Vocational Education and Training Forum 2015
Prince Hotel & Residence
27th May 2015
The Malaysia Automotive Institute (MAI) is an agency of the Ministry of International Trade and Industry (MITI)

- We are a think tank, tasked with strengthening the Malaysian Automotive Industry

- An Intermediary between stakeholders in Malaysia's automotive community

- We Formulate policies & perform research on the industry

- We also develop human capital & coordinate between public and private sectors
  - ✓ Research
  - ✓ Technology
  - ✓ Human Capital
  - ✓ Supply Chain
  - ✓ Outreach
The objectives of MAI are:

- To act as strategic thinker for the Malaysian automotive industry
- To develop and promote the competitiveness of the Malaysian automotive industry

The roles of MAI are:

- To transform the Malaysian automotive industry into a globally competitive sector
- To harness and mobilise collective efforts amongst the automotive stakeholders in the planning and implementation of industrial strategy towards a common direction at national level.
- To undertake strategic research and studies for inputs and policy advice to the Government.
The scope of work includes both

A. MANUFACTURING SECTOR
   1. Motor Vehicles covering passenger and commercial vehicles
   2. Motorcycles
   3. Parts and Components related to the above

B. AFTER SALES SECTOR
   1. Dealers and Distribution
   2. Servicing
   3. Recycling
   4. Remanufacturing
# ISSUES AROUND AUTO INDUSTRY

<table>
<thead>
<tr>
<th>STAKEHOLDERS</th>
<th>ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Small scale</td>
</tr>
<tr>
<td></td>
<td>Low technology (lack of direction)</td>
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<tr>
<td></td>
<td>Low exports</td>
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<td></td>
<td>Approved Permit</td>
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<td></td>
<td>Low automation</td>
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<td></td>
<td>Low skilled foreign workers</td>
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<tr>
<td></td>
<td>Incomplete eco-system</td>
</tr>
<tr>
<td>Consumer</td>
<td>High Prices of car</td>
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<tr>
<td>General</td>
<td>Low fuel standards</td>
</tr>
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<td></td>
<td>Impact to environment</td>
</tr>
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<td></td>
<td>Safety</td>
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</tbody>
</table>
JURANG RANTAIAN PEMBUATAN AUTOMOTIF
(AUTO MANUFACTURING MISSING LINKAGES)

INTERMEDIATE SECTOR

- HEAVY FORGERS
- HEAVY CASTINGS
- MACHINE BED
- MACHINE PARTS
- LARGE MOULD BASES

PRIMARY SECTOR

- ROLLING MILLS
- STEEL BARS & PLATES
- STEEL REFINERS
- WROUGHT IRON
- NON FERROUS SMELTER

RESOURCE SECTOR

- PETROCHEMICAL
- NATURAL RESOURCES
- OIL
- IRON ORE
- PLASTIC MATERIALS

MANUFACTURING SECTOR

- MANUFACTURERS
  - Plastic Moulders
  - Extruders
  - Forgers
  - Pressworks
  - Foundries
  - Diecasters
  - Machining
  - Rubber Moulders

SUPPORTIVE SECTOR

- DESIGNERS
  - ENGINEERING DESIGNERS
  - PRODUCT DESIGNERS
- TOOLS, DIES & MOULDS MAKERS
- MACHINE MAKERS
- MACHINES DESIGN

MISSING LINKAGES
RANTAIAN SELEPAS JUALAN SEKTOR AUTOMOTIF (AUTO AFTER MARKET LINKAGES)

- SOURCE OF VEHICLE
- VEHICLE OWNERSHIP
- END-OF-LIFE VEHICLE (ELV)
- DEPENDENT
- INDEPENDENT
- FRANCHISE
- BRANCHES

AUTOMOTIVE MANUFACTURING INDUSTRY

VEHICLE TESTING

WORK SHOPS
- INDEPENDENT
- FRANCHISE
- BRANCHES

ACC’ RIES CENTRES
- INDEPENDENT
- FRANCHISE

TYRE CENTRES
- INDEPENDENT
- FRANCHISE

NEW PARTS CENTRES
- INDEPENDENT
- FRANCHISE
- BRANCHES

USED PARTS CENTRES
- INDEPENDENT

RECYCLE
- REMAN
- ATF
JURANG RANTAIAN SELEPAS JUALAN SEKTOR AUTOMOTIF (AUTO AFTER MARKET MISSING LINKAGES)

AUTOMOTIVE MANUFACTURING INDUSTRY

MISSING LINKAGES

UNREGULATED

WORK SHOPS
- INDEPENDENT FRANCHISE
- BRANCHES

ACC’ RIES CENTRES
- INDEPENDENT FRANCHISE

TYRE CENTRES
- INDEPENDENT FRANCHISE

NEW PARTS CENTRES
- INDEPENDENT FRANCHISE
- BRANCHES

USED PARTS CENTRES
- INDEPENDENT

VEHICLE TESTING

END-OF-LIFE VEHICLE (ELV)

USER

DEALERS
KENDERAAN BERTENAGA EFISIEN (EEV)

- Low Fuel Consumption
- Low emissions

EEV

- EV
- PHEV
- Hybrid
- Fuel Cell

CNG

- Mono-Fuel
- Bi-Fuel
- CNG-DI

Diesel

- Bio-Diesel
- Euro 4

Electric

Fuel Efficient

EEV – FUEL EFFICIENCY AND CARBON EMISSION
ACROSS ALL VEHICLE TYPES AND SEGMENTS
CURB WEIGHT
ENERGY EFFICIENT VEHICLES (EEV)

DEFINITION OF ENERGY EFFICIENT VEHICLE

EEV is defined as vehicles that meet a set of define specification in terms of carbon emission level (g/km) and fuel consumption (l/100km). EEV includes fuel efficient vehicles, hybrid, EV and alternatively fuelled vehicles e.g. CNG, LPG, Biodiesel, Ethanol, Hydrogen and Fuel Cell.
## EEV Specification for Cars

<table>
<thead>
<tr>
<th>SEGMENT</th>
<th>DESCRIPTION</th>
<th>CURB WEIGHT (KG)</th>
<th>FUEL EFFICIENCY (L/100KM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Micro Car</td>
<td>&lt; 800</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>City Car</td>
<td>801 – 1,000</td>
<td>5.0</td>
</tr>
<tr>
<td>B</td>
<td>Super Mini Car</td>
<td>1,001 – 1,250</td>
<td>6.0</td>
</tr>
<tr>
<td>C</td>
<td>Small Family Car</td>
<td>1,251 – 1,400</td>
<td>6.5</td>
</tr>
<tr>
<td>D</td>
<td>Large Family Car</td>
<td>1,401 – 1,550</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>Compact Executive Car</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Executive Car</td>
<td>1,550 – 1,800</td>
<td>9.5</td>
</tr>
<tr>
<td>F</td>
<td>Luxury Car</td>
<td>1,801 – 2,050</td>
<td>11.0</td>
</tr>
<tr>
<td>J</td>
<td>Large 4x4</td>
<td>2,051 – 2,350</td>
<td>11.5</td>
</tr>
<tr>
<td>Others</td>
<td>Others</td>
<td>2,351 – 2,500</td>
<td>12.0</td>
</tr>
</tbody>
</table>
# ENERGY EFFICIENT VEHICLES (EEV)

## EEV SPECIFICATION FOR TWO WHEELERS

<table>
<thead>
<tr>
<th>ENGINE SIZE</th>
<th>FUEL EFFICIENCY (L/100KM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 – 100</td>
<td>2.0</td>
</tr>
<tr>
<td>101 – 150</td>
<td>2.2</td>
</tr>
<tr>
<td>151 – 200</td>
<td>2.5</td>
</tr>
<tr>
<td>201 - 250</td>
<td>3.0</td>
</tr>
</tbody>
</table>
GREEN AUTOMOTIVE LIFECYCLE

- Disposing
- Recycling
- Re-manufacturing

MFG
- OEM
- Vendor
- Tool Makers

3R

ELV
- Definition
- Standards
- Testing

LIFE SPAN
- Vehicle
- Components
- Accessories

re-manufacturing
<table>
<thead>
<tr>
<th>Direction Strategies</th>
<th>Supply Chain Development</th>
<th>Human Capital Development</th>
<th>Safety, Security &amp; Environment</th>
</tr>
</thead>
</table>
| Investment           | Hub for Energy Efficient Vehicles  
• Attract selected FDI  
• Encourage strategic DDI | Technology & Engineering  
In line with Latest Technology  
• Adopt & Adapt  
• Infrastructure  
• Streamline R&D | Manufacturer  
• OEMs  
• Vendors  
After Sales  
• Remanufacturing |
| | | | Carbon Reduction  
Fuel Efficiency  
Preserving Natural Resources |
ROADMAPS IN NAP 2014

There are 6 roadmaps developed to complement the execution of the NAP 2014. These roadmaps are namely:

1. Malaysia Automotive Technology Roadmap (MATR)
2. Malaysia Automotive Supply Chain Development Roadmap
3. Malaysia Automotive Human Capital Development Roadmap
4. Malaysia Automotive Remanufacturing Roadmap
5. Malaysia Automotive Authorized Treatment Facilities (ATF) Framework
6. Malaysia Automotive Bumiputera Development Roadmap
<table>
<thead>
<tr>
<th>ITEM</th>
<th>2020</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Passenger Car</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Production Vol.</td>
<td>1.25 mil units</td>
<td>~0.57 mil units</td>
</tr>
<tr>
<td>Total Industry Vol.</td>
<td>1.0 mil units</td>
<td>~0.65 mil units</td>
</tr>
<tr>
<td>Exports</td>
<td>250,000 units</td>
<td>~20,000 units</td>
</tr>
<tr>
<td><strong>Commercial Vehicles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Production Vol.</td>
<td>100,000 units</td>
<td>~55,000 units</td>
</tr>
<tr>
<td><strong>Motorcycle</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Production Vol.</td>
<td>800,000 units</td>
<td>~430,000 units</td>
</tr>
<tr>
<td>ITEMS</td>
<td>2020</td>
<td>2013</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Employment</td>
<td>Manufacturing</td>
<td>Additional 70,000</td>
</tr>
<tr>
<td></td>
<td>Aftermarket</td>
<td>Additional 80,000</td>
</tr>
<tr>
<td>Export of Parts &amp; Components</td>
<td></td>
<td>RM 10 Billion</td>
</tr>
<tr>
<td>Export of Recycled Materials &amp; Remanufactured Components</td>
<td></td>
<td>RM 2 Billion</td>
</tr>
</tbody>
</table>
Malaysia Automotive Technology Roadmap (MATR)
MATR is a supplementary document to the NAP 2014 charting the technology development roadmap envisioned to further assist the development of the automotive industry towards achieving the macro objective of the NAP 2014 via;

- **Adoption, adaptation and innovation of green technology** within the automotive supply chain focusing on product development, process development, manufacturing and customer aftersales services.
- **Development of appropriate standardisation and testing regulations** within the manufacturing industries and aftersales.
- **Infrastructure development** to support the “green” automotive products and ecosystem.
The development of MATR includes several crucial measures such as:

- reducing carbon emission
- improving fuel consumption
- enhancing safety & security
APPROACH

In setting the timeframe for the MATR, the most suitable guideline adopted is the forecasted evolution of the “Energy Efficient Vehicle (EEV)” from “Internal Combustion Engine (ICE)” to full “Electric Vehicles (EV)” as portrait in figure 2 and figure 3. The current approach towards EEV are centred on two routes, namely;

1) Continuous improvement on the current ICE engine to meet the EEV classification and specification

1) Combination of ICE and electric motor (hybrid)
Malaysia Automotive Roadmap – Highlight

Global Automotive Roadmap

- Energy Efficient ICE
- ICE + Electric Hybrid Engine
- Electric
- Fuel Cell

Present

2020

2030

2040

Time Frame

Automotive Industry Transformation Route

Route 1

Route 2

Internal Combustion Engine (ICE)

ICE

- Fossil Fuel

- EEV DIESEL
- BIODIESEL
- SYNTHETIC FUEL

- FOSSIL FUEL + ELECTRIC

- FULL ELECTRIC

- HYDROGEN FUEL

Fig 2
The Needed Dynamics for Skill Development based on NAP 2014
The development stage

- **Level 5**: Supplier is able to perform its own research on the product improvement, ideas, conceptual outcome and propose to the OEM.

- **Level 4**: Component idea, concept and requirement given by the OEM.
  - Supplier will come out with component design, detail specification and component manufacturing.
  - Supplier are able to improve and giving alternative to OEM.

- **Level 3**: Detail Component specification given by the OEM.
  - Supplier responsible to perform component tooling design, testing, production facilities and manufacture the component.
  - Supplier able to warrant part reliability.

- **Level 2**: Component design, drawing and specification given by OEM.
  - Supplier responsible to design and fabricate production facilities and manufacture the component.

- **Level 1**: Component Specification, Design and production facilities prepared by OEM.
  - Supplier concentrated in production and maintaining the facilities.
The development stage

Product design
Product design is a process creating new part from concept to mass production.

Process design
Process design is an exercise to determine, design and develop the right manufacturing techniques, inclusive of tooling requirement and development, to produce the product being designed.
Current Supplier Competitiveness Level (SCL) in Malaysia
The followings are the set targets under the NAP 2014 for the local vendors to achieve global capability or SCL;

- To Improve 180 vendors to achieve level 5 according to the global definition
- To Improve 150 vendors to achieve level 4 according to the global definition
- To Improve 100 vendors to achieve level 3 according to the global definition
The Manufacturing Stage

Vehicles assembly can be divided five sections, namely; Body, Interior, Chassis, and Engine and Powertrain (BICEP),

**MANUFACTURERS**
- Plastic Moulders
- Extruders
- Forgers
- Presswork
- Foundries
- Diecasters
- Machining
- Electronic Components Manufacturers
- Rubber Moulders

**SUB ASSEMBLERS**

**MAJOR ASSEMBLERS**

**CONSUMER**
- PUBLIC COMPANIES; TNB, TELEKOM
- GENERAL PUBLIC CONSUMERS
- CONSTRUCTION & OTHER INDUSTRIES

Fig 1 - INDUSTRIAL LINKAGES NAP$2014$FOCUS$ FOR$DEVELOPMENT
Quality, cost and delivery are the OEM main concern within the supply network. Quality parts are needed to be delivered on time and at competitive prices by the parts manufacturers.

Customers demand for lower vehicle prices has exerted pressure on OEMs to reduce their vehicle cost of manufacture.

Foreign brands are aggressive entering the local market with their competitive priced vehicles.

This in turn has led to the demand for the local parts and components manufacturers to be creative in reducing their products costs by improving their processes and material selections in their respective production line.
The Aftermarket Stage
Aftermarket operations consist of all activities related to vehicle maintenance after the initial sale until the end of life of the vehicles. The activities include; replacement parts, accessories, lubricants, appearance products and service repairs, as well as additional innovative services that help to optimize the use of the vehicle.

Available data as at 31 December 2012 there are a total of 22,713,018 motor vehicles in used in Malaysia. Some 10.3 million of these total are vehicles of less than 15 years of age, and the breakdown is as follows;
- 2.8 million LESS THAN 5 years old
- 2.4 million BETWEEN 5 to 10 years old
- 5.1 million
The Aftermarket Stage

Authorized Treatment Facilities (ATF)

- In respect of vehicles disposal after their end of life, development Authorized Treatment Facilities (ATF) will be promoted, under the NAP 2014, to ensure the vehicles are disposed of without environmental contamination.

- Contaminants such as lead acid batteries, fluids including lubricating oil, coolant, brake fluid, and catalytic convertors, all of which must be disposed of safely in order to prevent pollution.
The Aftermarket Stage

The roles and responsible of ATF operator including,

1. Issue the registered owner with a certificate of destruction.
2. Ensure the facility is operated under an appropriate waste licence or permit.
3. Meet the minimum technical requirements for the storage, treatment and recovery of end-of-life vehicles and the storage of components containing fluids, spare parts, etc.
4. Keep records of end-of-life vehicle materials for reuse, recycling, recovery and disposal and report these records to local authorities.
What is Remanufacturing?

1. Remanufacturing is a process where used parts are disassembled, clean, repair, and reassemble to be used again.
2. Remanufacture ensures the same product quality, durability and performance as new components while maintaining sustainability of resources.
3. Remanufacturing is an emerging industry of strategic importance, which encompasses energy savings, and environmental protection.
4. Compared with making new products, remanufacturing is estimated to save energy by 60%, and raw materials by 70%, while it also substantially reduces air pollutants.
The Aftermarket Stage

Fig 7 : Product Life Cycle
The Aftermarket Stage

Voluntary Vehicle Inspection
The PUSPAKOM private initiative on voluntary inspection conducted over a 5-year period (2008 – 2012) indicated the following findings:

1. In 2012 alone, 59% of those vehicles inspected were found to be technical failed
2. Most private vehicles inspected failed due to brake ineffectiveness and side slip problems, which contributed to more than 40% of the total failures;

Voluntary inspection to be introduced under the NAP 2014 is not intended to scrap vehicle based on the life expectancy. The main objective of this measure is to enhance safety of consumers and vehicles on the road through Voluntary annual inspection.
Thrust areas for Skills Development

In consultation with the industry, the results of the assessment and gap study reported in *Malaysia Automotive Human Capital Roadmap (MAHR)*, identifies the following thrust areas are in need of immediate attention;

1. Promote Digital Engineering
2. Adopt and adapt technical engineering based education
3. Leverage on vocational based training
4. Introduce new and review existing curriculum and skills standard
5. Continual Learning
Thrust 1: Promote Digital Engineering

- Digital engineering is a process to realize highly complex product design and production process design capability through computer, information, modelling technology and simulation applications that includes Computer Aided Design (CAD), Computer Aided Manufacturing (CAM) Product Lifecycle Management (PLM) etc.
- Inability of some automotive vendors to invest or to exploit the digital engineering system for their parts design and development contributes to many acute problems faced by the OEMs in their vehicle design endeavours
- Malaysian automotive manufacturing community have no alternative but to aggressive pursuit the Digital Engineering Practice soonest possible in order to remain competitive.
Thrust 1: Promote Digital Engineering

Enhance Industry Design & Engineering Capabilities

OEMs/Vendors

Digital Engineering & Prototyping Program (DEP)

Research Institution (Local/International)

Technology Partners

Universities

MALAYSIA AUTOMOTIVE INSTITUTE
- Guideline – Coordinator – Policy – Promotion – Government Link-
Thrust 2 - Adopt and adapt technical engineering based education

- While academic education is important for the development of research and technology in the country, technical education is crucial to support the government’s vision to become industrialized country by year 2020.

- The technical education is particularly important for automotive industry that based on advanced technology. Competent personnel with technical background are required in design, prototype, manufacturing, service maintenance, remanufacturing and recycling.
Thrust 3 - Leverage on vocational based training

- The Government vision to transform the technical education and vocational training (TEVT) sector in a move to make TEVT more appealing to students.

- Automotive industry (manufacturing) alone required 55,500 technical workforces by 2020 for manufacturing sector to develop Malaysia as a regional hub for Energy Efficient Vehicles (EEV).

- Example Work-based Learning
Thrust 3 - Leverage on vocational based training
Thrust 4 - Introduce new and review existing curriculum and skills standard

- The technology in vehicle design and manufacturing has improved tremendously to meet the requirements of various stakeholders. Conventional skilled workers that mainly focus on manual operation are not competitive. They are expected not only to handle the processes but also to perform basic maintenance and conduct trouble shooting.

- In order to train competent worker with above skills, the skills development programme must be based on curriculum and skills standard that are up to date and industry driven.
Thrust 5 - Continual Learning

- High competition in the automotive industry has forced all car manufacturers to shorten the model development cycle time from 6 to 7 years to 3 to 4 years. Not only that, the technology is changing rapidly to meet the global trends like low fuel consumptions, low carbon emission, light weight, safety, affordability etc.

- All of the above requirements can only be achieved through application of advanced technology. In order to remain competitive, the automotive community have no choice but to adopt the continual learning approach and it should involve at all levels of the workforce, from working level up to top management level.
Conclusion

1. Human Capital Development for the automotive industry must be driven by industry.
2. Human Capital Development for the automotive industry should consider the technology trends and government policy.
3. MAI as a focal point for the automotive industry should create a platform for educators and industry players to come together to discuss the way forward in Human Capital Development.
4. Continual learning should be encouraged for the existing workers in the automotive industry to maintain their productivity and competitiveness.
5. This roadmap should be reviewed periodically with all stakeholders to ensure it is relevant to the current automotive industry scenario.
THANK YOU