Education and training in automotive component manufacturing

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The Graduate School of Technology Management (GSTM) has long identified the importance of research on technological innovation in the automotive manufacturing industry, with the aim of contributing to industry practice and government policy. In the domain of global trade, the value of the international trade of vehicles and automotive components contributes the dominant proportion of the manufactured goods category (more than one third of the total value traded). Automotive manufacturing is also the largest manufacturing subsector in South Africa, largely due to generous government support, driven by the need for socioeconomic benefits, particularly in respect of the creation of advanced technology jobs.

Having been around for more than a century, the automotive industry is a primary example of a mature industry with many well-established multinational corporations, strong power relationships and leading-edge technologies. Competition for business among global players has grown to extreme levels. This has made it even more important to upgrade via innovation to defend and grow market share, with technology-based innovation at the forefront.

One would expect education and training to be the key enablers to achieve technological innovation, as technology-based innovation requires managers and employees to understand the new technologies that are emerging in their field of business.

To explore how this dynamic plays out in the South African automotive component manufacturing industry, a survey was conducted in industry to obtain information on the level of education and extent of innovation and training for innovation. The purpose of the survey was to gain an improved understanding of how education and training can enable the technological innovation capability of firms in the automotive component manufacturing industry. Better understanding of how this works should enable firms to make more effective choices in acquiring the resources they need for innovation. It should also enable government to plan its support for innovation and for education and training more effectively.

The study was planned in collaboration with researchers at the University's Gordon Institute of Business Science (GIBS) and Lund University in Sweden. The latter linkage provided the benefit of information on data obtained in the automotive component manufacturing industries in India and China via a study using the same questionnaire, financed by the Swedish Research Council.

For the South African study, members of the National Association of Automotive Component and Allied Manufacturers (NAACAM) were approached. NAACAM represents the largest number of automotive component manufacturers with the most employees in the sector.

For the South African survey, 75 responses were obtained, while 190 responses were obtained for China and 272 for India.

From a comparison between the average education levels for companies in South Africa, China and India (see Table 1), it is evident that India and China have a much higher percentage of staff with higher levels of education than South Africa does. This is consistent with the much higher level of own design that is required for own original equipment manufacturer (OEM) brands that is prevalent in India and China.

Table 1: Proportion of employees according to level of education

Education level	Average percentage of staff so educated		
	South Africa	China	India
Technical education/training	19%	46%	41%
University degree	5%	44%	30%
Graduate studies	2%	10%	12%

From the total responses, it is evident that innovation is fairly evenly spread between the various categories (see Table 2), with approximately two thirds of respondents indicating improved processes and more than half indicating improved products and services or improved organisational methods. When compared with the data from China and India, it appears that South African manufacturers, together with their counterparts in China, fared comparatively worse than those in India on product innovation in both products and services. South African manufacturers reported notably higher levels of innovation in improved manufacturing methods.

In general, the levels of innovation reported are much closer between South Africa, India and China than education levels. In the context of the high own OEM brand activity in China and India, innovation in South Africa – being tailored to follow the requirements of multinational OEMs and component parent companies or licensors – appears to require lower education levels. The comparatively higher level of innovation in improved manufacturing methods in South Africa can be attributed to new OEM model introductions, rather than own initiative in gaining increased business.

The survey also compared training (as an innovation activity) in South Africa to that in China and India (see Table 3). Companies in South Africa are much more dependent on international training, which is consistent with their dependency on multinationals.

As can be expected, the profile of the level of education and the kind of training that automotive component manufacturers use in South Africa correspond to the dependency of the industry on innovation driven by multinational corporations.

Proclaimed government aspirations of greater competitiveness, increased sustainability and decreased dependency on government incentives would require higher-level skills and better local training opportunities, judging from the education level profiles and training locations in India and China, where these aspirations have been achieved in greater measures. On average, typically double the proportion of technical educated and trained staff would appear to be needed, and at least five times the proportion of university-level educated staff.

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Table 2: Innovation type

		Percentage of respondents involved		
		South Africa	China	India
Product	Improved goods	49%	48%	63%
	Improved services	32%	36%	52%
Process	Improved methods of manufacturing	61%	40%	34%
	Improved logistics	35%	34%	14%
Organisation	New internal management practices	55%	54%	54%
	New organisation of external relations	28%	26%	12%

Table 3: Training locality per country

	Percentage of respondents involved		
	South Africa	China	India
Local	28%	24%	79%
Domestic	16%	32%	12%
International	32%	2%	2%
Total	76%	58%	93%