



**DEPARTMENT OF TRADE AND INDUSTRY
POLICY SUPPORT PROGRAMME**

**IMPLICATIONS OF THE INFORMATION REVOLUTION FOR
ECONOMIC DEVELOPMENT IN SOUTH AFRICA PROJECT
CODE: A.1.009**

**D13
FINAL SECTORAL REPORT – AUTOMOTIVE SECTOR
(ICT DIFFUSION AND APPLICATIONS)**

JUNE 2002

Submitted by

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Acknowledgements

The study team would like to acknowledge the support of the European Union in providing the funds for this study and the Department of Trade and Industry (DTI) for initiating the project.

In particular, we would like to acknowledge Alan Hirsch, Chief Director, DTI Information Technology Cluster Team Leader, Pearl Thandrayan of the DTI and Wolfe Braude and his team from the Programme Management Unit of the DTI Policy Support Programme, without whose vision and commitment this study would never have been realised.

During the field work the study team interacted with many people across a range of industries. Their input and comments form the basis of this report, and the willingness of so many individuals to devote considerable time to answering the questionnaire is much appreciated.



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Executive Summary

Background and Motivation to the Information and Communication Technology (ICT) Diffusion Project

This report represents part of the second Phase of an eight-sector study, commissioned by the Department of Trade and Industry and funded by the European Union, to examine:

- i) The likely trajectories for the absorption of ICTs in a range of economic sectors; and
- ii) How to adjust the policies and strategies of the government and the domestic private sector to maximise the benefits to South Africa from the insights flowing out of i).

The project builds on existing research work but has at its heart the analysis of a number of 'vertical markets' for ICT, first through a worldwide scan (Phase I) and then through sectoral research in each of the chosen eight sectors.

The sectors selected were drawn from three broad categories – traditional sectors, service sectors, and new economy sectors, as follows:

Traditional

- Platinum Mining
- Automotive Manufacturing
- Clothing Manufacturing
- Deciduous Fruit Farming

Service

- Cultural Tourism
- Healthcare Information Flows

New Economy

- Biotechnology
- Multimedia

The objectives of the research work were to:

- Generate accurate, objective findings regarding patterns for absorption of ICTs in a range of SA economic sectors, in order to guide South African participants in vertical markets for ICT;
- Provide recommendations for impacting public and private sector policies;
- Guide the government in directing some of its existing and future intervention strategies, including research and development programmes and industrial development facilities, whether through the science vote or departmental programmes; and to
- Give government more guidance regarding the commitment of funds for human resource development.

Project Research Methodology

The overall approach adopted by the lead consultants was to use Sectoral Experts for the interviewing and primary research, with three ICT coordinators (responsible for up to three sectors each) ensuring consistency across the sectors. An International Consultant was employed to provide an external perspective to the research.

The research methodology for Phase I of this project (The International Scan) involved:

- Defining each of the eight industry sectors;
- Identifying the main players in the value chain; and then
- Performing secondary research on each of the sectors to obtain current data about the diffusion of ICTs into those sectors; and
- Identifying leading-edge applications, as far as possible.

Phase II (Diffusion of ICT in South Africa) involved the use of these sector and value chain definitions to identify the major role players and to set up interviews, based on a structured questionnaire, with selected stakeholders across the value chain.

The questionnaire consisted of both a generic section (i.e. used by all sectors) and a sector-specific section (i.e. aimed only at those interviewees within the sector). Most of the questions relied on the *perception* of the interviewee. A rating scale was typically used, but a number of 'open-ended' questions were included to allow interviewees to express opinions in a less structured way.

The questionnaire was subdivided into six generic sections and one sector-specific section:

- Background Information (Name, Address, Organisation Size, etc.)
- ICT Usage (of Technology and Applications)
- ICT Spending Patterns
- Sources of ICT Information and Training
- ICT Adoption: Drivers and Barriers
- Diffusion of ICT into Organisation/Sector
- A sector-specific section dealing with issues of importance to the particular sector.

Between 40 and 55 interviews were conducted per sector; these should not necessarily be construed as being representative of the sector, as the selection of interviewees was often dependent on personal contact from the sector researcher. Also, the responses from those interviewed undoubtedly contained an emotional bias (for example, the desire not to seem technologically backward), which would have influenced the responses. Hopefully, these biases have been minimised through the averaging process.

Analysis of the Results

The results from the questionnaires were captured on an Excel spreadsheet and a basic analysis performed centrally. This information was then fed back to the individual sector researchers for further analysis and comment. The generic portion of the questionnaire captured up to 117 separate items of information per respondent (either a rating, a comment or basic data), so that a

typical sector analysis involved 5000+ items. These responses were subdivided into various categories (e.g. Large, Medium, Small organisations) as applicable and further iterations performed.

Most of the results were shown graphically for ease of comprehension, although only basic statistical analysis was performed due to the nature of the data.

The Automotive Sector

The automotive sector in South Africa is typically described in terms of three sub-sectors: OEMs (Original Equipment Manufacturers, in this case the car assemblers), T1 (tier 1 suppliers, supplying to the OEMs), and T2 (tier 2 suppliers, supplying to the T1 suppliers). This study followed that classification and conducted interviews with fifty-two senior personnel in twenty-nine companies spread across the three sub-sectors. The interviewees responded to the items in the generic questionnaire as well as to a set of specific questions, several of which derive from previous research on the sector.

The summary findings from the generic questionnaire and the interviews include:

The sector shows wide use of servers, mainframes and PCs. Emerging technologies are moderately used, except for T2s who make little use of them. T1s make greater use of CAD/CAM than the others. This is not surprising, but the low uptake by T2s may indicate an opportunity.

LANs are fully utilized. However, OEMs make only moderate use of dialup connectivity and wireless networks, while the T1s and T2s make little use of them. Leased lines and WANs/VPNs are fully utilised by OEMs and moderately by T1s. But WANs/VPNs are little used by T2s.

E-mail has clearly established itself in all three tiers. Intranets and teleconferencing are also widely adopted by the OEMs but only modestly by the others. The Internet and CD-ROMs are modestly used by all. Videoconferencing is used by OEMs but not the others—one must ask with whom the OEMs are engaging as it is clearly not their upstream suppliers.

ICT is well-entrenched in support of business activities like accounting, payroll, etc. Stock control is another popular application area. Distribution planning is an application for OEMs and less so for the others. Business systems integration is reportedly high for T1s and less so for the other two. Manufacturing process control is moderately used by all. The balance of applications are weakly supported, with T1s being particularly slow in taking up ICT in the areas of marketing, customer services, and distribution planning and control (the latter impacting their relationship with the OEMs).

Surprisingly there is little evidence of ‘Transforming Business Processes’ via key new approaches such as business-to-business e-commerce and teleworking. The OEMs in particular express the need to work on B2B applications, customer relationship management, and streamlining business processes, particularly with respect to suppliers (the reasoning behind the latter being to cut costs). T1s are strongly concerned about B2B, with both the OEMs and the T2s. Getting shopfloor information for better control is also a concern.

T2s have a wider variety of concerns with less focus. CAD able to ‘talk’ with customers is one. Having better integrated data systems is another. Cost reduction seems the main concern. Teleconferencing also came up.

OEMs are most concerned that multiple standards do not emerge for B2B and create havoc with suppliers. Vulnerability of Telkom and VPN links are a concern and T1s are also concerned that a ‘Tower of Babel’ not develop in B2B. T2s express less concern about B2B and more about the capabilities of people as limiting ICT use.

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The ‘cost of bandwidth’ is also a concern. The OEMs want more accelerated Internet access (bandwidth) at a lower cost. In general, the cost of ICTs is a concern, as is the perceived poor appreciation of and skills to support ICT in the supplier base.

Participants felt their sector under-spends relative to global standards; but this is less strongly emphasised by the T1s.

As regards general sources of information, the priorities for sourcing are: Suppliers of software and hardware, Consultants and service providers, In-house experts, and via the Internet. Industry associations (Naamsa & Naacam), Chambers of Commerce, and Government training initiatives are not a source. Use of higher educational institutions (HEIs) is low, particularly for T2s.

With regard to training, the following table shows the most used sources. Again, a strong industry as opposed to academic focus is evident. As to the sufficiency of training for professionals, OEMs and T1s felt this was sufficient. T2s had a more mixed feelings, many saying it was not sufficient or not cost-effective. The use of ICTs in providing training is in its infancy; CBT is mentioned mostly by the OEMs, who also mention limited use of e-learning and the Internet as a source of training. This pattern is weaker for T1s and weaker still at T2s.

	OEM	T1	T2
Most used source	Suppliers of software & hardware	Private sector trainers	Suppliers of software & hardware
Second source	In-house experts	Consultants	Private sector trainers
Third source	Consultants	In-house training	Consultants
Fourth source	In-house training	Universities & Technikons	In-house experts

There is very little awareness of any government initiatives supporting ICTs in the auto industry. However, scattered among the OEMs, T1s and T2s are a very few mentions of the AIDC activities.

In their responses to drivers and obstacles regarding ICT usage, fourteen of the nineteen items in the questionnaire were identified as drivers towards adoption; clearly investment in ICTs is going to grow! In general the OEMs, T1s and T2s move in sympathy with each other; the one exception is that T2s are much more sensitive to economic conditions as an inhibitor. The main drivers were:

- Need to improve communications
- Need to respond to customer requirements
- Need for increased organisational efficiency
- Increased global business opportunities
- Increased influence from multinational firms
- Need to reduce paperwork

The pressure from expected competition in the medium term rather than the short term drives adoption.

It must be noted that attitudes of both senior managers and more junior personnel are seen as positive drivers supporting ICT adoption.

Regarding security of data and information, this is stated as of ‘extreme’ concern by OEMs, ‘very’ concerned by T1s and ‘quite’ concerned by T2s

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Regarding the confidentiality of personal data, a pattern similar to that stated in the previous paragraph emerges: the OEMs and T1s appear much more pro-active in protecting this data than the T2s.

The auto sector is seen as an early adopter of ICT globally and ahead at T1 level in South Africa. T1 respondents are particularly negative in viewing the innovativeness of their own companies, and see the sector in SA as lagging somewhat. Application of ICTs to administrative process management by the OEMs is seen to lag a little across the board (globally, locally, and their own companies). On the matter of managing relations with customers, suppliers, etc., the OEMs see, across the board, a tendency to early adoption. Regarding obtaining expertise at a distance (via the Internet), the OEMs again have an across the board view, of late majority.

When asked ‘what types of projects/incentives/schemes should be initiated immediately to stimulate the use of ICTs in the auto sector and industry as a whole, the following rough consensus emerged across the sub-sectors:

- The need for common standards for OEMs to communicate (B2B) with their suppliers. Industry to lead. (Very strong message.)
- Cost and speed of communication "pipe" must be dramatically improved. Or worded differently, reduce telecommunication costs and improve infrastructure (bandwidth). Government to lead.
- Training at all levels to create an understanding of the ‘what, why and how’ of ICT. Government initiative at school level.
- Cost of software and ICT skilled people; what of subsidies or tax benefits in this area? (This also covers the OEMs concern for SME incentives for ICT investment.)

There was a specific set of questions unique to the automotive sector. They were designed to identify the main application successes of the past and where plans lie for the future.

Out of twenty three application areas listed, the three sub-sectors were quite unanimous on the first four: JIT materials management, production-inventory control, production scheduling, and integrating information systems within the business unit. But then the differences begin, with the ‘engineering’ needs of the T1s and T2s showing up in high use of CAD and CAM. Nothing speaks more loudly than the 100% of OEMs working on integrating the supply chain with only 60-70% of the suppliers doing so—this is a key need identified in this study. The rankings for this item are shown in the table below, with low numbers indicating greater importance. The table indicates that OEMs are considerably more advanced in their thinking. T1s and T2s are giving priority to integration within their own companies rather than the supply chain.

Place in Supply Chain	Integrating information systems		
	With distributors	With suppliers	Within the business unit
OEMs	3	5	9
T1s	12	8	4
T2s	16	13	4

In summary, the overriding concern of participants in the automotive supply chain is one of communication. In particular it is the B2B communication via ICTs. It is feared that the absence of an agreed common communications system and standard could lead to a ‘Tower of Babel’ situation. In this scenario, systems are hardly compatible and suppliers have to make a number of expensive investments to allow them to communicate with their multiple downstream customers.

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Another cause for concern arising from an analysis of the data is that the further upstream companies have different ICT priorities from those downstream. The OEMs are concerned about supply chain integration while Tier 2 companies are concerned about internal integration of information systems. This is also symptomatic of the less advanced status of T2s (and T1s to a lesser extent) vs. OEMs. Cost of ICTs and the cost and availability of skilled ICT people is also a greater concern to upstream companies than the OEMs.

Respondents are almost universally critical of the cost and availability of what they refer to as 'bandwidth.' It is at Telkom's door that they wish to lay the blame. Many would like to see more competition in the supply of the telecommunications infrastructure.

An appeal is also made to make ICT training more broadly available 'to create an understanding of the what, why and how' of ICT. In the view of the auto sector this should start at school level. Furthermore, tax and other incentives should be available to encourage companies to invest in the development of people with ICT skills.

Export opportunities of locally developed software exist. But it is felt that some DTI support may be needed to exploit these opportunities.

1 Sector Summary

The overriding concern of participants in the automotive supply chain is one of communication. In particular it is the B2B communication via ICTs. It is feared that the absence of an agreed common communications system and standard could lead to a ‘Tower of Babel’ situation. In this scenario, systems are hardly compatible and suppliers have to make a number of expensive investments to allow them to communicate with their multiple downstream customers.

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2 Overview of Interviews

Fifty two people from twenty nine companies in the manufacturing and assembly supply chain of the automobile industry were involved in interviews. The views were captured in the survey questionnaire. Companies not interviewed were truck manufacturers and fleet operators. The focus was thus on the manufacturing supply chain – there are many companies at work there – and the variety of interview responses within this supply chain seemed to warrant the focus there. Table 1 provides an overview of numbers, supply chain position and expertise of interviewees. It is clear that the further up the supply chain one goes, the less involved people are with ICT.

Throughout the report reference is made to OEMs (Original Equipment Manufacturers, in this case the car assemblers), T1 (tier 1 suppliers, supplying to the OEMs), and T2 (tier 2 suppliers, supplying to the T1 suppliers).

Table 1: Characteristics of Interviewees

Place in Supply Chain	Interviewees’ Average Involvement with ICT	Number of Companies	Number of Interviewees
OEM	4.8	7	16
T1	3.8	14	23
T2	3.5	8	13

In addition to the OEMs, T1s and T2s, a small number of other companies was interviewed outside of this supply chain; not being manufacturers their views were not captured in the survey questionnaire. Comments from this latter set of interviews are:

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Companies working on leading edge applications, or in touch with 'partner' companies so occupied, effectively played poker with the interviewer, not revealing *anything* of their ICT plans.

These companies in fact tried to interview the interviewer to find potential applications for themselves.

Vehicle tracking appears to be an industry where South African companies have produced globally competitive products.

3 ICT Usage

This section examines the extent of ICT usage in OEMs, T1 and T2 companies in the auto sector. It is clear that T2s make less use of ICTs than the others.

3.1 ICT Hardware

Table 2 shows that servers, mainframes and PCs are comprehensively used. Emerging technologies are moderately used, except for T2s who make little use of them. T1s make greater use of CAD/CAM than the others. This is not surprising, but the low uptake by T2s may indicate an opportunity.

Table 2: ICT Hardware Usage

	2.1 PC's	2.2 Servers/ mainframes	2.3 CAD/CAM technologies	2.4 Emerging technologies
OEM	4.53	4.53	3.33	3.4
T1	4.48	4.87	4.13	3.17
T2	4.38	4.38	3.31	2.08

3.2 Communications Infrastructure

Table 3 refers. LANs are fully utilized. OEMs make only moderate use of dialup connectivity and wireless networks, while the T1s and T2s make little use of them. Leased lines and WANs/VPNs are fully utilised by OEMs and moderately by T1s. But WANs/VPNs are little used by T2s.

Table 3: ICT Usage in Communications Infrastructure

	2.5 Local Area Networks (LANS)	2.6 Wide Area & Virtual Private Networks (WANs/VPNs)	2.7 Dialup Internet Connectivity	2.8 Leased Line Internet Connectivity	2.9 Wireless Networks for Data Transmission
OEM	4.93	4.20	3.53	4.27	3.13
T1	4.96	3.78	2.00	3.78	1.17
T2	4.62	1.85	2.54	3.38	1.08

3.3 Information Acquisition and Communications

Table 4 refers. E-mail has clearly established itself in all three tiers. Intranets and teleconferencing are also widely adopted by the OEMs but only modestly by the others. The Internet and CD-ROMs are modestly used by all. Videoconferencing is used by OEMs but not the others – one must ask with whom the OEMs are engaging as it clearly not their upstream suppliers.

Table 4: ICT Usage in Information Acquisition and Communications

	2.10 CD-ROM sources	2.11 E-Mail	2.12 Tele-conferencing
OEM	2.87	4.93	4.07
T1	3.13	4.83	3.00
T2	2.54	4.92	2.77
	2.13 Video-conferencing	2.14 Intranets & Extranets	2.15 Internet
OEM	3.60	4.13	3.47
T1	1.65	3.09	2.70
T2	1.69	2.62	3.08

3.4 Streamlining Business Processes

Table 5 refers. ICT is well-entrenched in support of business activities like accounting, payroll, etc. Stock control is another popular application area. Distribution planning is an application for OEM and less so for the others – this fact is endorsed in section 9 of this report (analysis of the data from section 7 of the survey). Business systems integration is reportedly high for T1s and less so for the other two. Manufacturing process control is moderately used by all. The balance of applications are weakly supported, with T1s being particularly slow in taking up ICT in the areas of marketing, customer services, and distribution planning and control (the latter impacting their relationship with the OEMs).

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Table 5: ICT Usage for Streamlining Business Processes

	2.16 Strategy & Planning Activities	2.17 Business Support Activities	2.18 Marketing & Sales	2.19 Customer Service	2.20 R&D, Design & Production (CAD/CAM)
OEM	3.40	4.60	3.27	3.07	3.07
T1	2.70	4.70	1.65	1.61	3.78
T2	2.38	4.77	2.23	2.23	3.08
	2.21 Purchasing/procurement (e.g. EDI)	2.22 Manufacture process Control	2.23 Stock & Warehouse Management	2.24 Distribution Planning & Control	2.25 Business Process/Systems Integration (e.g. ERP)
OEM	3.40	3.60	4.07	4.07	3.60
T1	2.35	3.57	3.65	2.96	4.00
T2	2.92	3.38	4.23	3.31	3.62

3.5 Transforming Business Processes

Table 6 refers. There is not much usage here. Considerable scope for further uptake exists.

Table 6: ICT Usage in Transforming Business Processes

	2.26 Providing	2.27 Interactive	2.28 B2C e-Com	2.29 B2B e-Com	2.30 Tele-working
OEM	3.13	2.53	2.27	2.80	1.73
T1	0.96	1.74	0.61	1.57	0.96
T2	2.00	2.62	0.54	1.23	0.62

3.6 Technologies and Application Areas Needing Most Emphasis

The OEMs express the need to work on B2B applications, customer relationship management, and streamlining business processes, particularly with respect to suppliers. The reasoning behind the latter is to cut costs.

T1s are strongly concerned about B2B, with both the OEMs and the T2s. Getting shopfloor information for better control is also a concern.

T2s have a wider variety of concerns with less focus. CAD able to 'talk' with customers is one. Having better integrated data systems (ERP?) is another. Cost reduction seems the main concern. Teleconferencing also came up.

3.7 Technologies and Application Areas Which Are Inhibitors to Goals

OEMs are most concerned that multiple standards do not emerge for B2B and create havoc with suppliers. Vulnerability of Telkom and VPN links are a concern. E-mail 'nuisance' (unwanted e-mail?) creates inefficiency.

T1s are also concerned that a 'Tower of Babel' not develop in B2B.

T2s express less concern about B2B and more about the capabilities of people as limiting ICT use. The 'cost of bandwidth' is a concern.

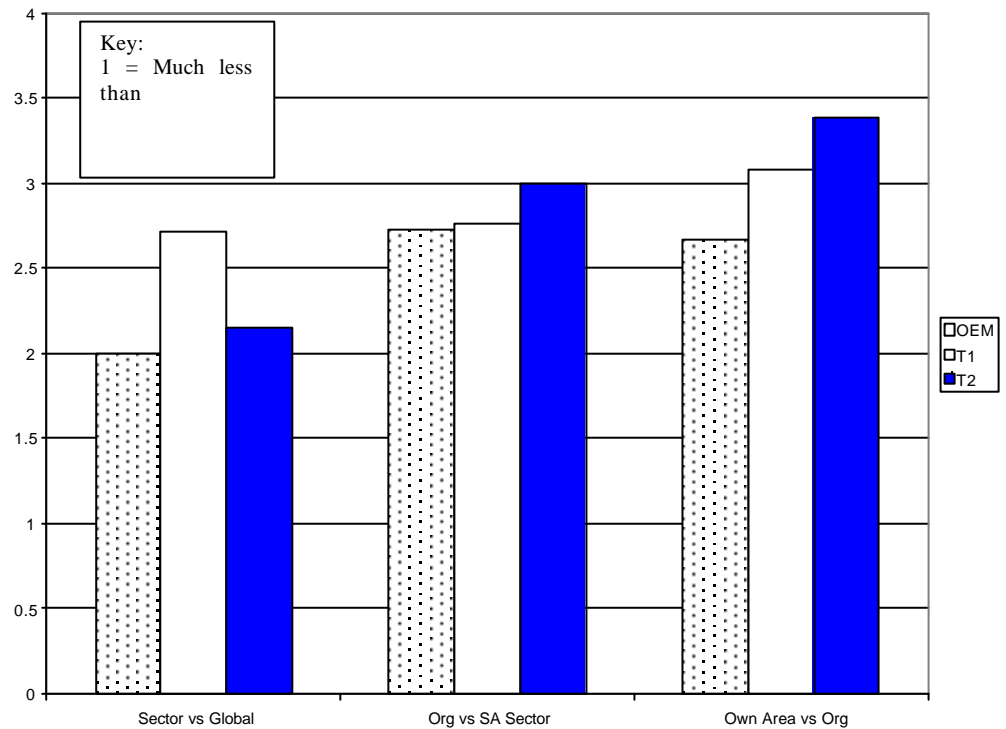
3.8 Technology Gaps

The OEMs want more accelerated internet access (bandwidth) at a lower cost. In general, the cost of ICTs is a concern, as is the perceived poor appreciation of and skills to support ICT in the supplier base.

4 ICT Spending Patterns

The bar graph (Figure 1) shows that participants felt their sector under-spends relative to global standards; this is less severe for the T1s. With respect to expenditure in the auto sector in SA they feel they are slightly under the norm, but in their own organisations they feel they get about what others are getting.

Figure 1: ICT Spending Patterns



5 Sources of ICT Information and Training

Figure 2 shows clearly that all use similar sources, with the OEMs being the most intensive users. The priorities for sourcing are: Suppliers of software and hardware, Consultants and service providers, In-house experts, and via the Internet. Industry associations (Naamsa & Naacam), Chambers of Commerce, and Government training initiatives are not a source. Use of higher educational institutions (HEIs) is low, particularly for T2s.

Figure 2: Sources of ICT-related Information

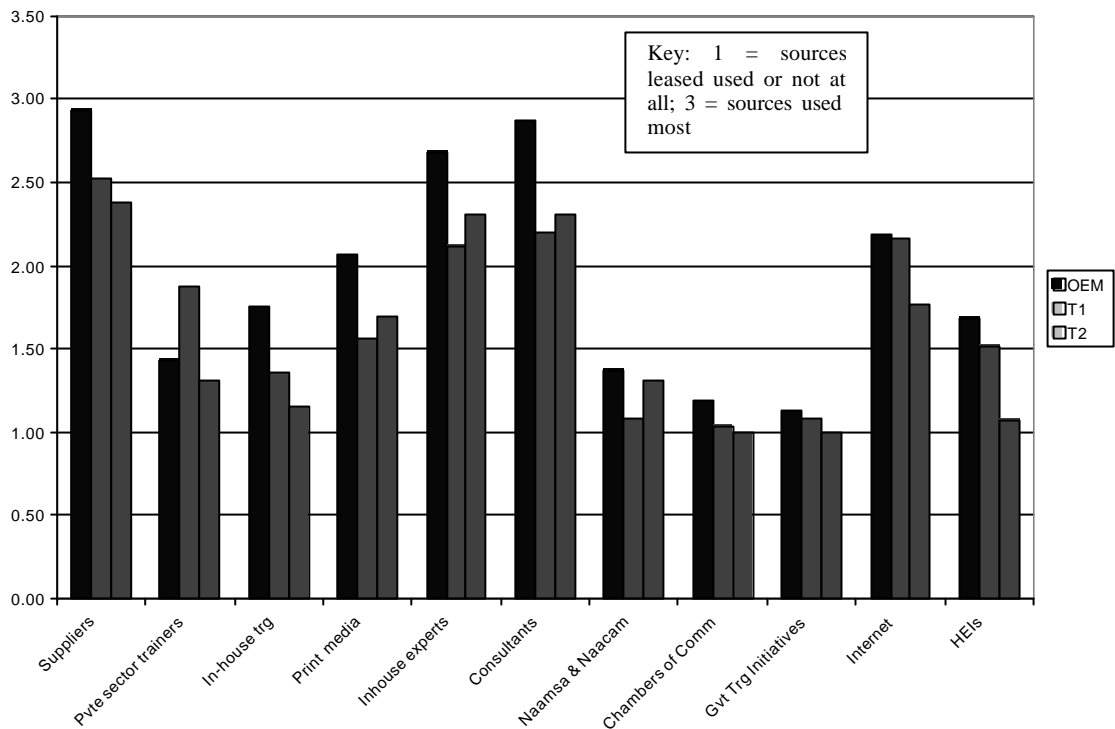
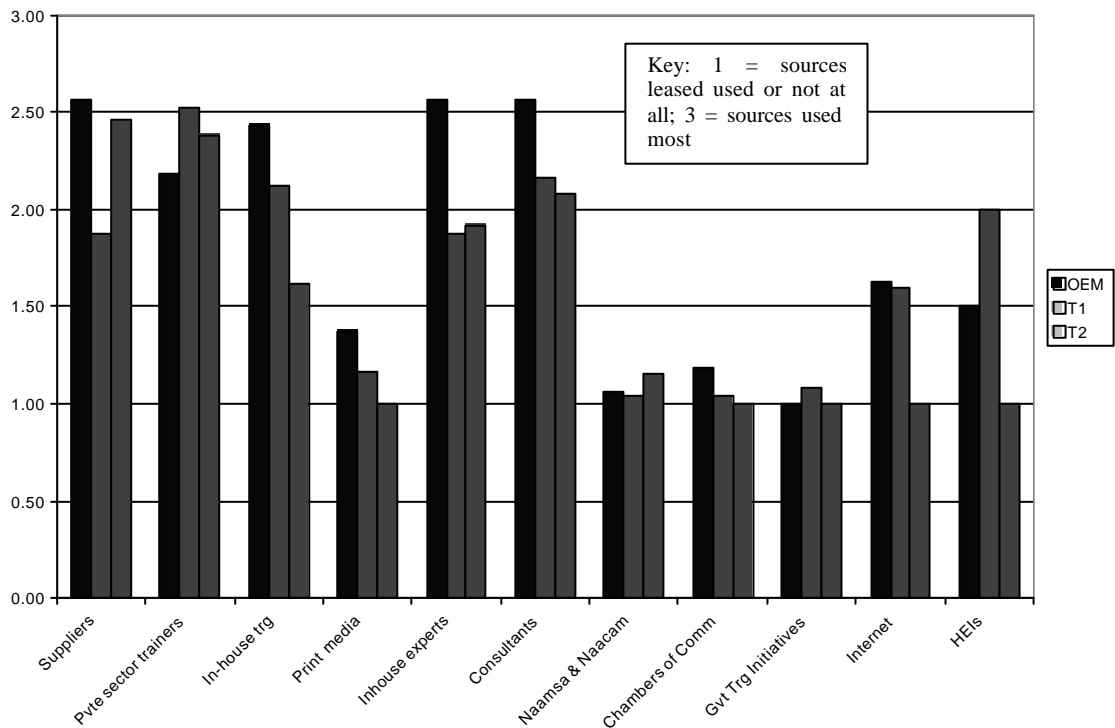


Figure 3: Sources of ICT-related Training



The bar graph (Figure 3) on sources of training shows a similar pattern, but in fact there is some variation as highlighted by Table 7 (below).

Table 7: Top Four Sources of Training by Tier

	OEM	T1	T2
Most used source	Suppliers of software & hardware	Private sector trainers	Suppliers of software & hardware
Second source	In-house experts	Consultants	Private sector trainers
Third source	Consultants	In-house training	Consultants
Fourth source	In-house training	Universities & Technikons	In-house experts

However, the differences are not great and there does not appear to be any significance in this.

As to the sufficiency of training for professionals, OEMs and T1s felt this was sufficient. T2s had a more mixed feelings, many saying it was not sufficient or not cost-effective.

The use of ICTs in providing training is in its infancy; CBT is mentioned mostly by the OEMs, who also mention limited use of e-learning and the Internet as a source of training. This pattern is weaker for T1s and weaker still at T2s.

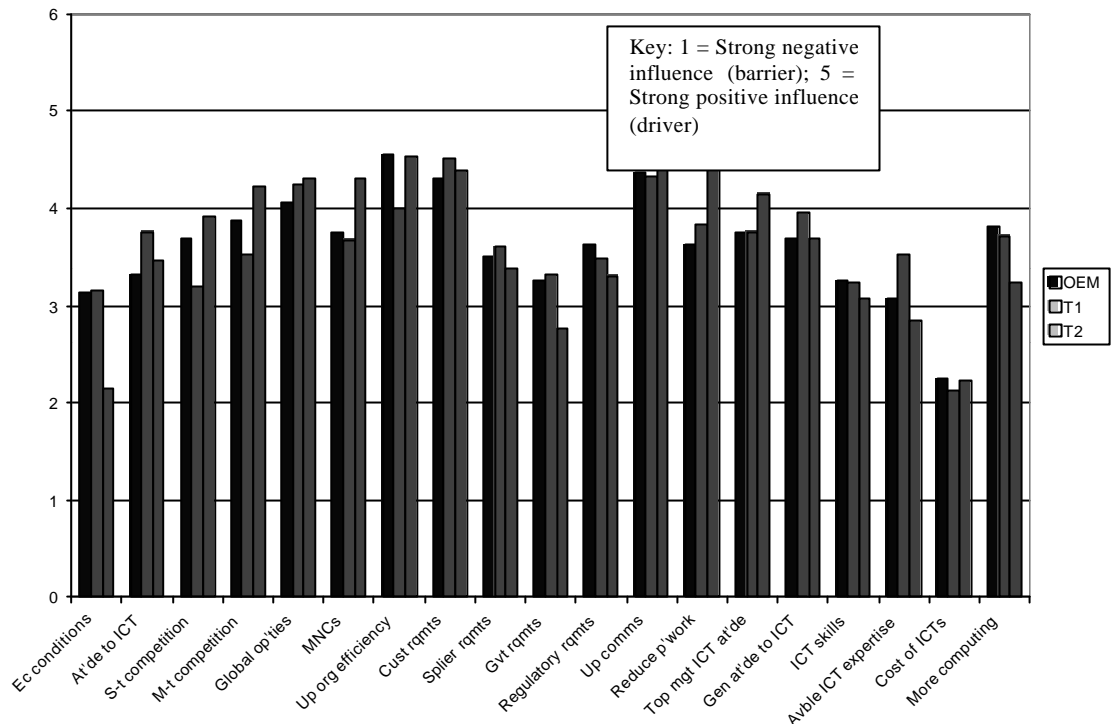
There is very little awareness of any government initiatives supporting ICTs in the auto industry. However, scattered among the OEMs, T1s and T2s are a very few mentions of the AIDC activities.

6 ICT Adoption: Drivers and Barriers

Figure 4 (below) refers. Of the 19 factors listed, 14 appear as drivers towards adoption (average scores above 3); clearly investment in ICTs is going to grow! In general the OEMs, T1s and T2s move in sympathy with each other; the one exception is that T2s are much more sensitive to economic conditions as an inhibitor. The main drivers are listed here:

- Need to improve communications
- Need to respond to customer requirements
- Need for increased organisational efficiency
- Increased global business opportunities
- Increased influence from multinational firms
- Need to reduce paperwork

Figure 4: ICT Adoption Drivers and Barriers



The pressure from expected competition in the medium term rather than the short term drives adoption.

It must be noted that attitudes of both senior managers and more junior personnel are seen as positive drivers supporting ICT adoption.

Regarding reporting lines, the CIO invariably reports to the Finance Director. This is true for OEMs, T1s and T2s. This may well have implications for the application of ICTs outside of finance, as in linking with customers and suppliers, and applications within product design, engineering and manufacturing. Some contracting or outsourcing of the function was reported at T1 and T2 levels.

Regarding security of data and information, this is stated as of 'extreme' concern by OEMs, 'very' concerned by T1s and 'quite' concerned by T2s. OEMs appear to use a full range of protection: back-up procedures, security & virus audits, firewall infrastructure, access administration, and encryption.

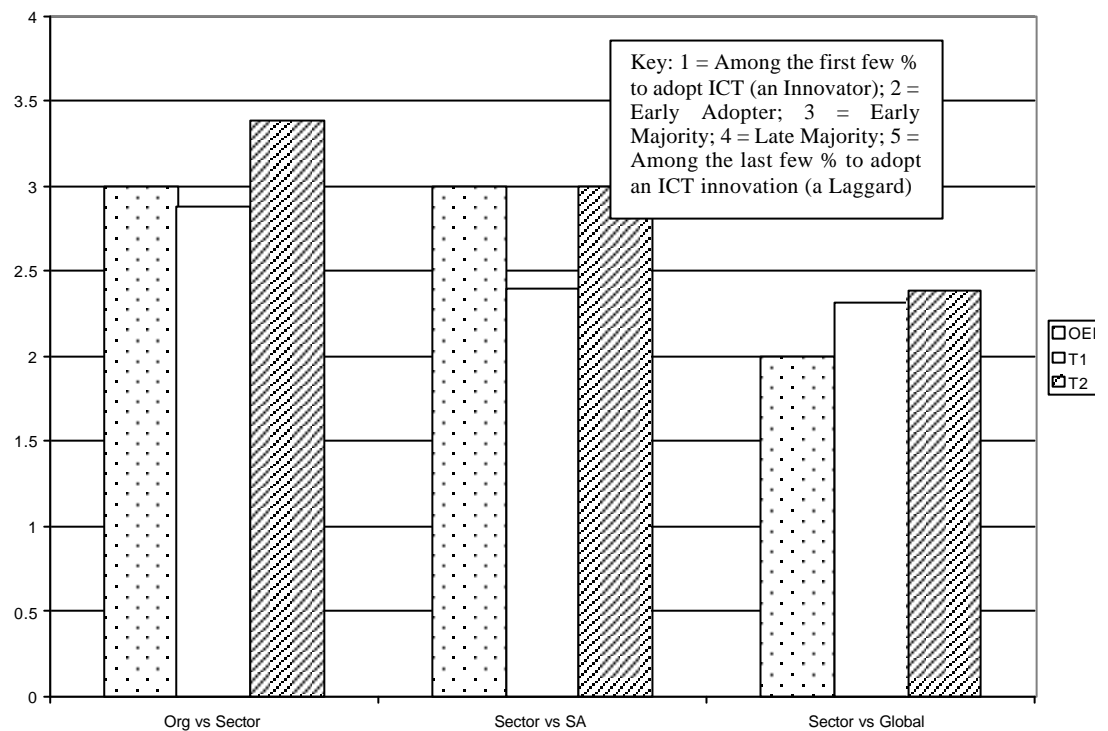
Regarding the confidentiality of personal data, a pattern similar to that stated in the previous paragraph emerges: the OEMs and T1s appear much more pro-active in protecting this data than the T2s.

7 Diffusion of ICT into Companies and the Automotive Sector

7.1 The Extent of Diffusion

The bar charts on the following pages refer. Figure 5 refers to the application area of product and service innovation. Here the auto sector is seen as an early adopter globally and ahead at T1 level in South Africa. But their own organisation is seen as being in the middle of the park regarding other auto companies in SA and the OEMs and T2s have a similar perspective regarding the sector in SA.

Figure 5: Extent of Diffusion of ICTs in Product and Service Innovation



Regarding the extent of diffusion in marketing applications (Figure 6), the auto sector globally is seen as being in the middle, but locally is behind. T1 respondents are particularly negative in viewing the innovativeness of their own companies, and the sector in SA, as lagging somewhat. The OEMs see themselves and the sector in SA as taking the middle ground.

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Figure 6: Extent of Diffusion of ICTs in Market Innovation

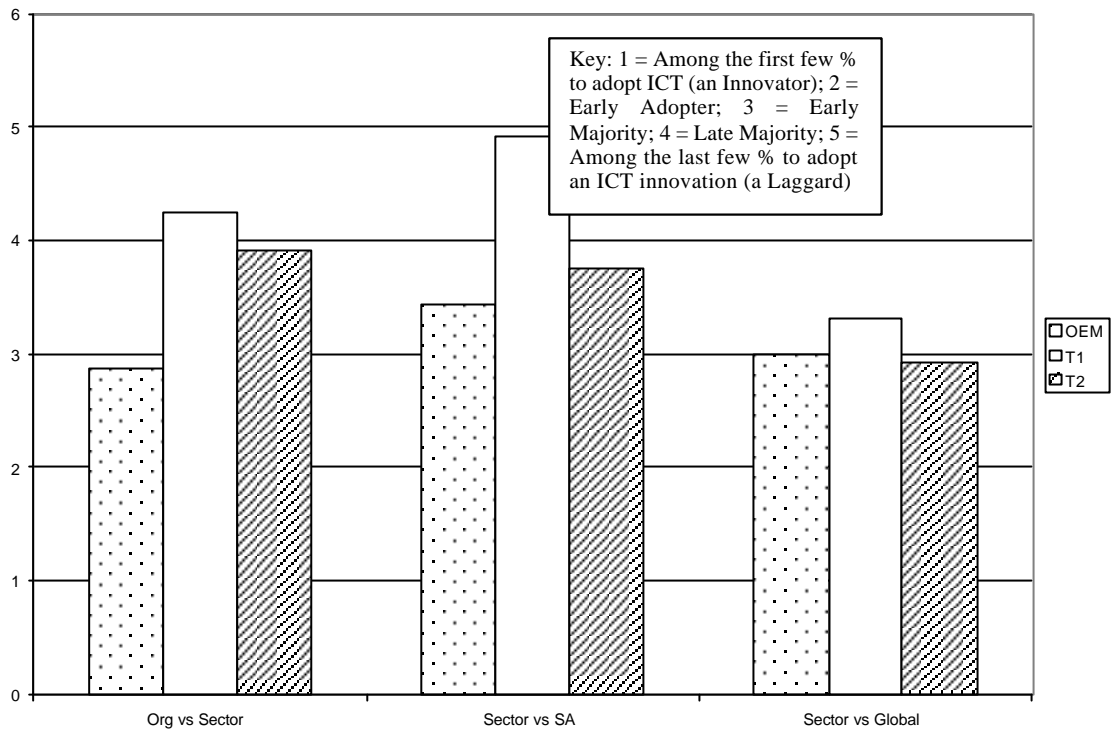


Figure 7: Extent of Diffusion of ICTs in Administrative Process Management

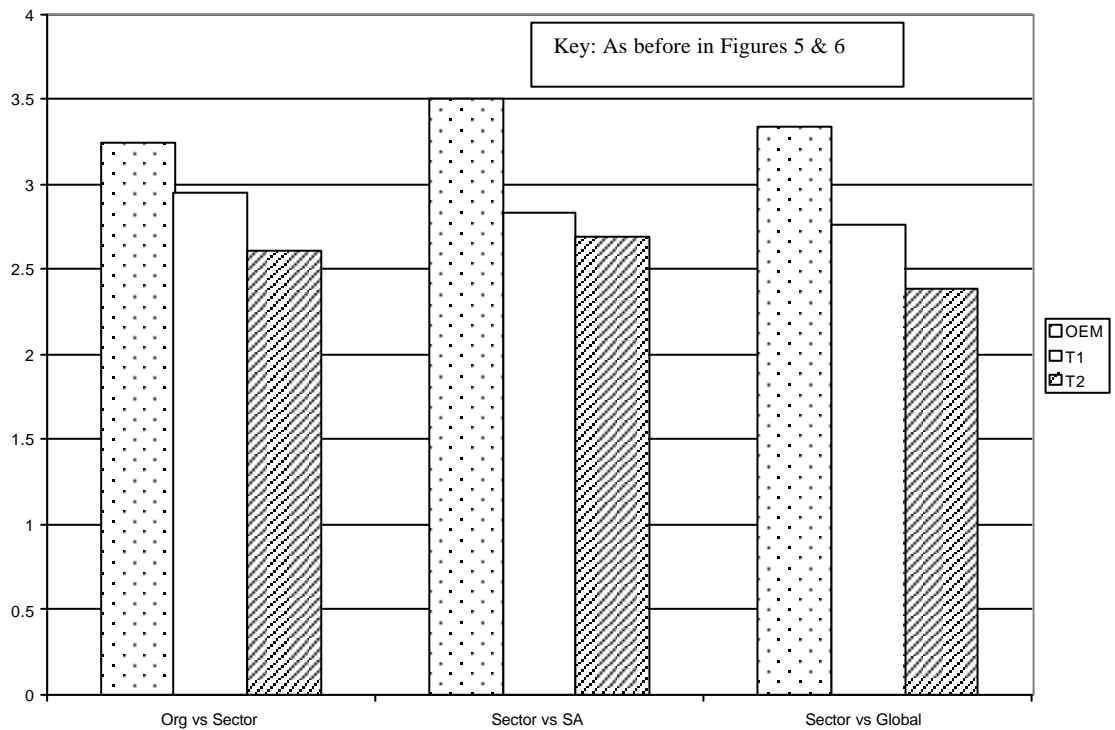


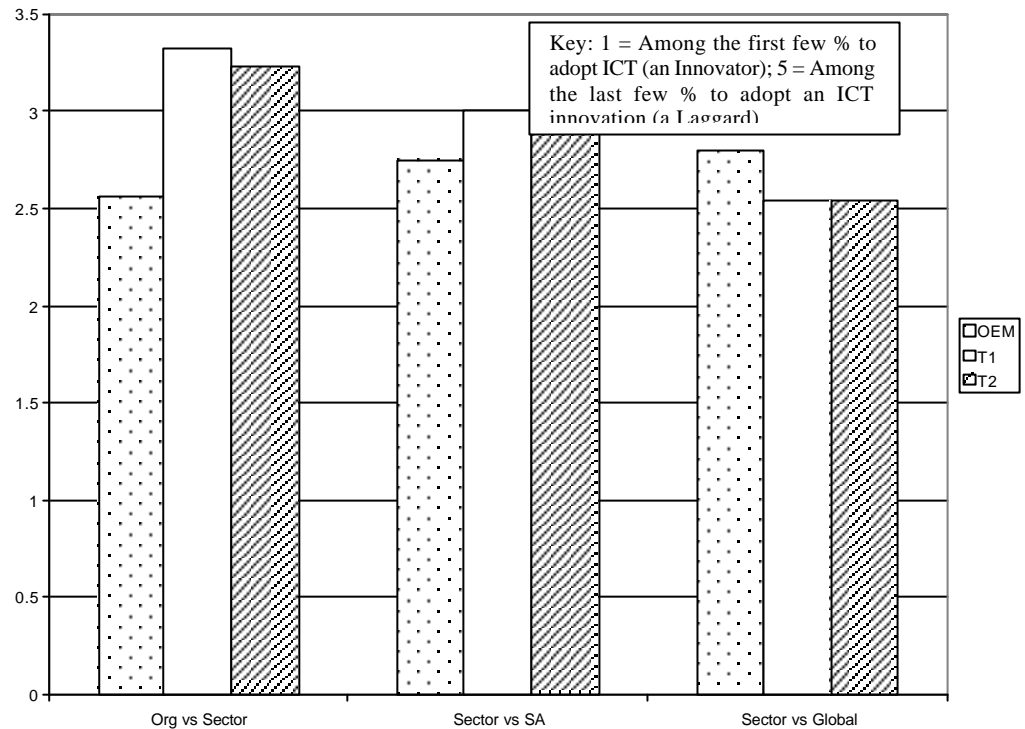
Figure 7 refers. Application of ICTs to administrative process management by the OEMs is seen to lag a little across the board (globally, locally, and their own

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companies). The T2s believe, in the other extreme, that, across the board, they tend to lead somewhat more than the OEMs would believe. The T1s lie in-between.

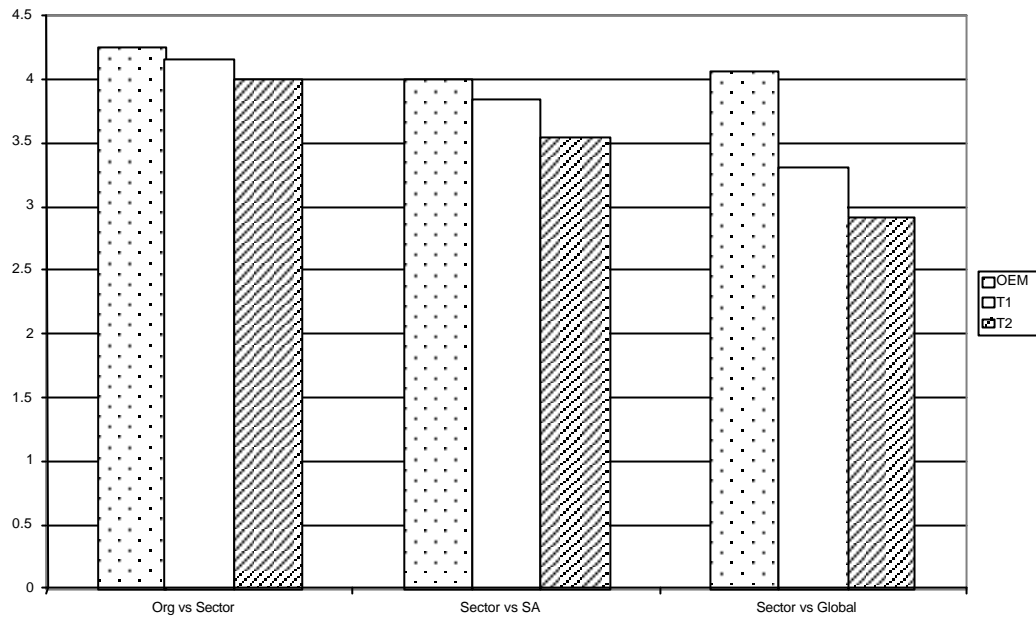
On the matter of managing relations with customers, suppliers, etc.(Figure 8), the OEMs see, across the board, a tendency to early adoption. T1s and T2s see the global industry as tending to early adoption, but judge their own companies and the auto sector in SA to be in the middle of the road.

Figure 8: Extent of Diffusion of ICTs in Relationship Management



Regarding obtaining expertise at a distance (via the Internet) (Figure 9), the OEMs again have an across the board view, of late majority. T1s and T2s believe the auto sector globally is in the middle, but see their own companies and the auto sector in SA as closer to late majority.

Figure 9: Extent of Diffusion of ICTs in Resource Management



7.2 Suggested Projects and Incentives to Stimulate the Use of ICTs in the Auto Sector

When asked ‘what types of projects/incentives/schemes should be initiated immediately to stimulate the use of ICTs’ in the auto sector and industry as a whole, the following emerged from the OEMs:

- The need for common standards for OEMs to communicate (B2B) with their suppliers. Should be lead by industry.
- Incentives to SME's to invest in ICT - just as skills incentives are in place. (This said with the suppliers in mind.) Government to lead.
- Clear wireless standards for SA (UMTs and GPRS) would open up communications everywhere. Government to lead.
- Reduce telecommunication costs and improve infrastructure (bandwidth). Government to lead.
- Relaxation of broadcasting regulations to allow companies to use satellite broadcasting. Government to lead.
- DTI should encourage export of ICT related technologies (one MNC subsidiary competes within the MNC globally for exports in this area).

T1s had this to say:

- The need for common standards for OEMs to communicate (B2B) with their suppliers. (Very strong message.)
- Cost and speed of communication "pipe" must be dramatically improved. Or worded differently, reduce telecommunication costs and improve infrastructure (bandwidth). Government to lead.
- Training at all levels to create an understanding of the what, why and how of ICT.

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- Cost of software and ICT skilled people; what of subsidies or tax benefits in this area?

T2s had the same comments as the T1s, with the following additional points:

- They however felt that training should start at school level.
- Cost of software and ICT skilled people; what of subsidies or tax benefits in this area? (This also covers the OEMs concern for SME incentives for ICT investment.)

The consensus view then is:

- The need for common standards for OEMs to communicate (B2B) with their suppliers. Industry to lead. (Very strong message.)
- Cost and speed of communication "pipe" must be dramatically improved. Or worded differently, reduce telecommunication costs and improve infrastructure (bandwidth). Government to lead.
- Training at all levels to create an understanding of the what, why and how of ICT. Government initiative at school level.
- Cost of software and ICT skilled people; what of subsidies or tax benefits in this area? (This also covers the OEMs concern for SME incentives for ICT investment.)

8 Applications of ICT: Past Payoff and Future Emphasis

This section was unique to the automotive sector. It was designed to identify the main application successes of the past and where plans lie for the future.

Figure 10: Percentage of Respondents Who Used Respective Programmes Ranked by OEMs

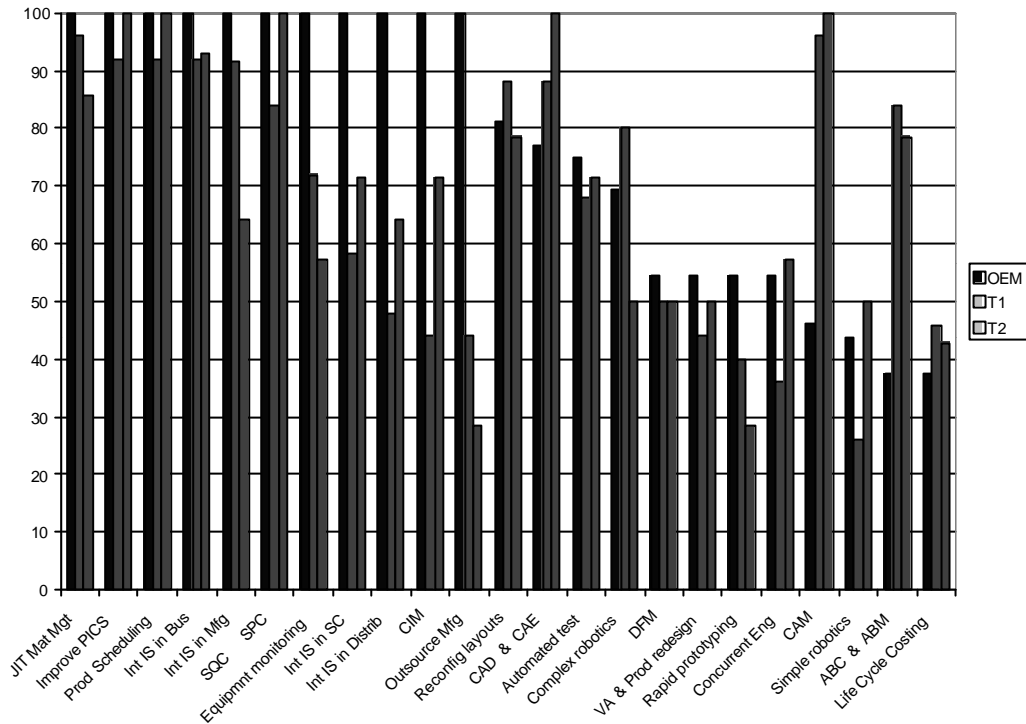


Figure 10 shows the percent usage in each area of application, ranked from most to least used by OEMs. The different needs of the OEMs, T1s and T2s are clear. The first four applications (JIT materials management, production-inventory control, production scheduling, and integrating information systems within the business unit) are pretty unanimous. But then the differences begin, with the ‘engineering’ needs of the T1s and T2s showing up in high use of CAD and CAM. Nothing speaks more loudly than the 100% of OEMs working on integrating the supply chain with only 60-70% of the suppliers doing so – this is the key need identified in the previous section.

Past payoff ranked for OEMs, T1s and T2s is shown in the next three bar charts to follow, Figures 11 to 13. They indicate clearly what has been effective to those that used them and can guide members of each tier to reflect on their own implementation efforts and be challenged by the successes of others in their tier. For instance, rapid prototyping was only reported by 40% of T1s, but was the number one payoff item for T1s. It is noteworthy that T2s display lower payoffs across virtually the whole range of applications, probably reflecting poorer skills to implement the ICTs (also reflected in the previous section was their concern about the availability and cost of ICT skills).

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Figure 11: Past Payoff Ranked by OEM

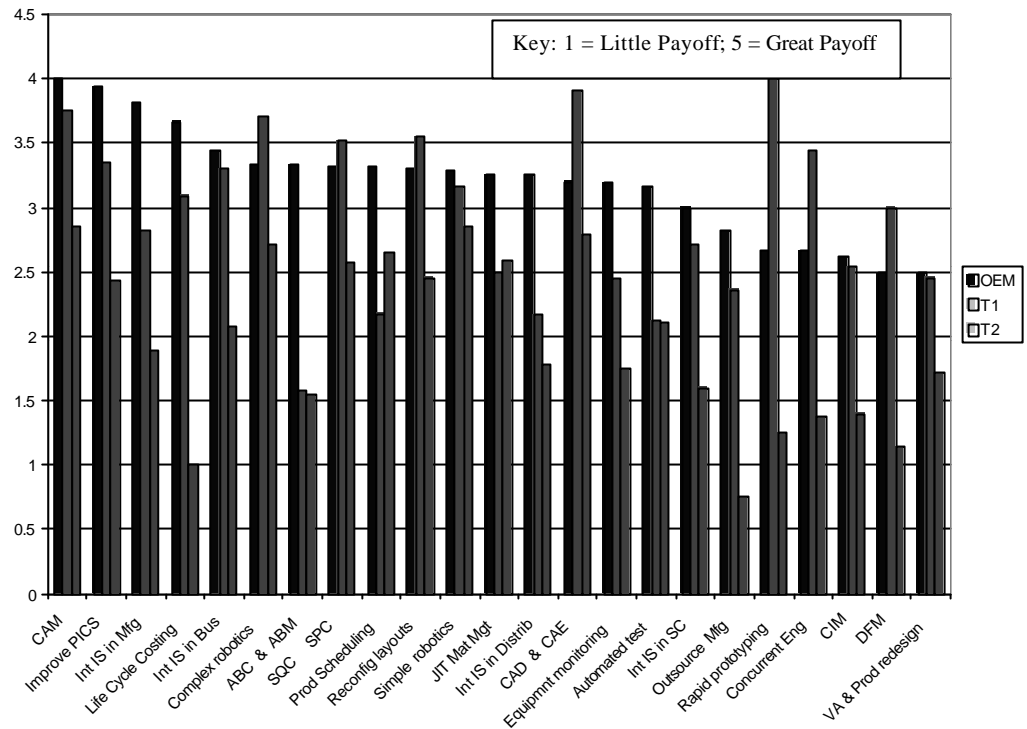
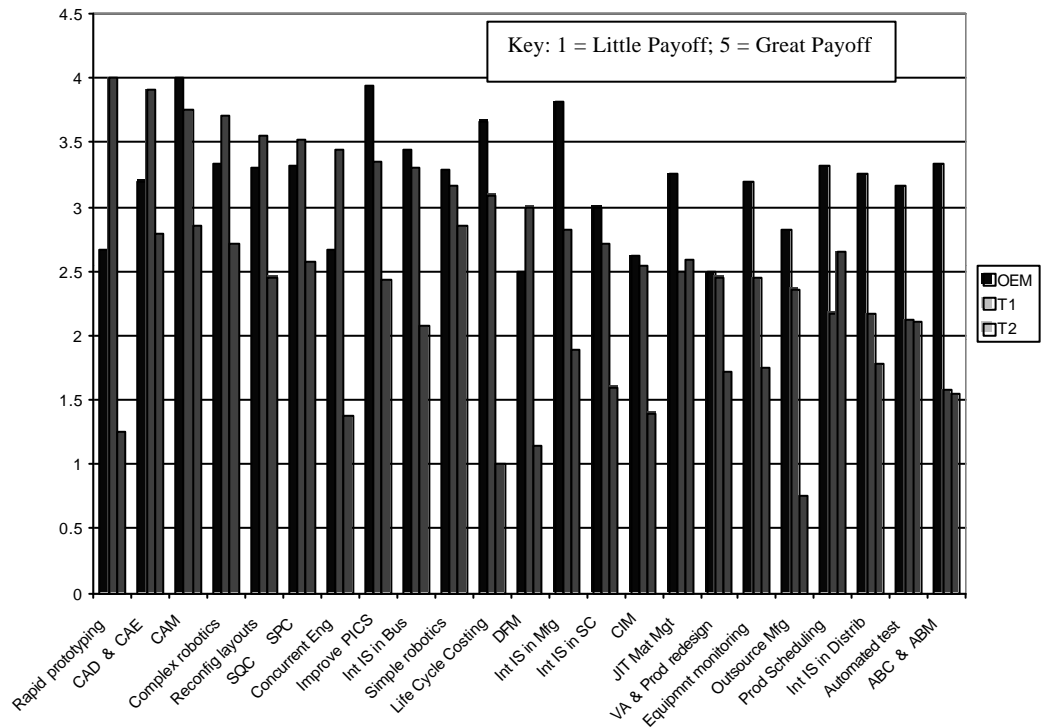
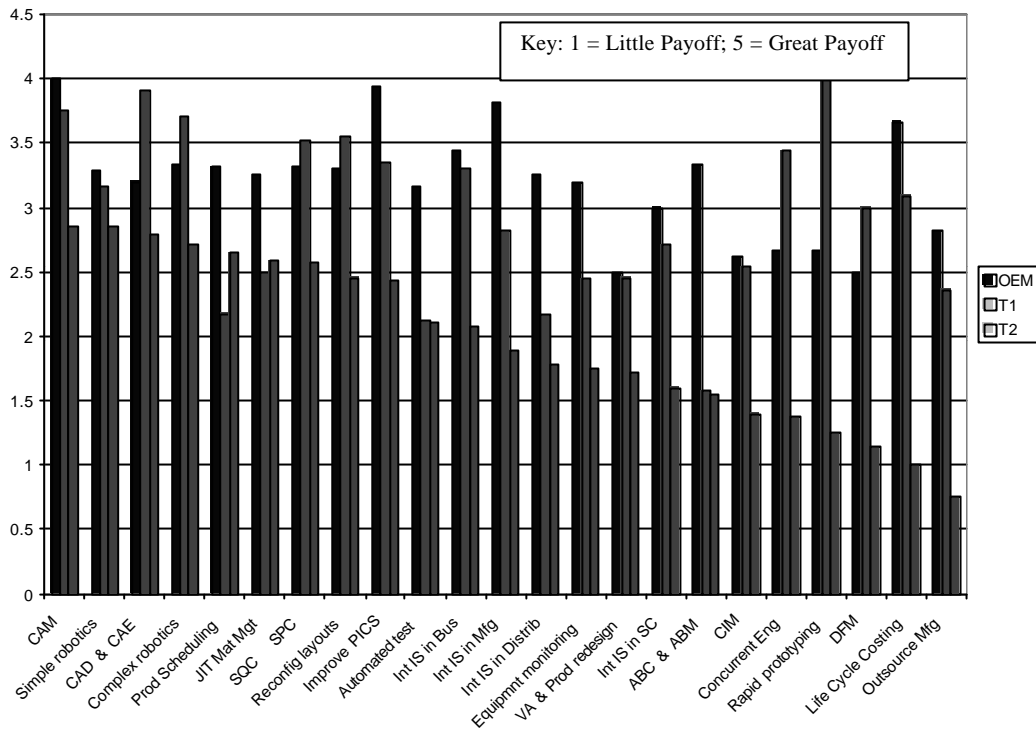


Figure 12: Past Payoff Ranked by T1



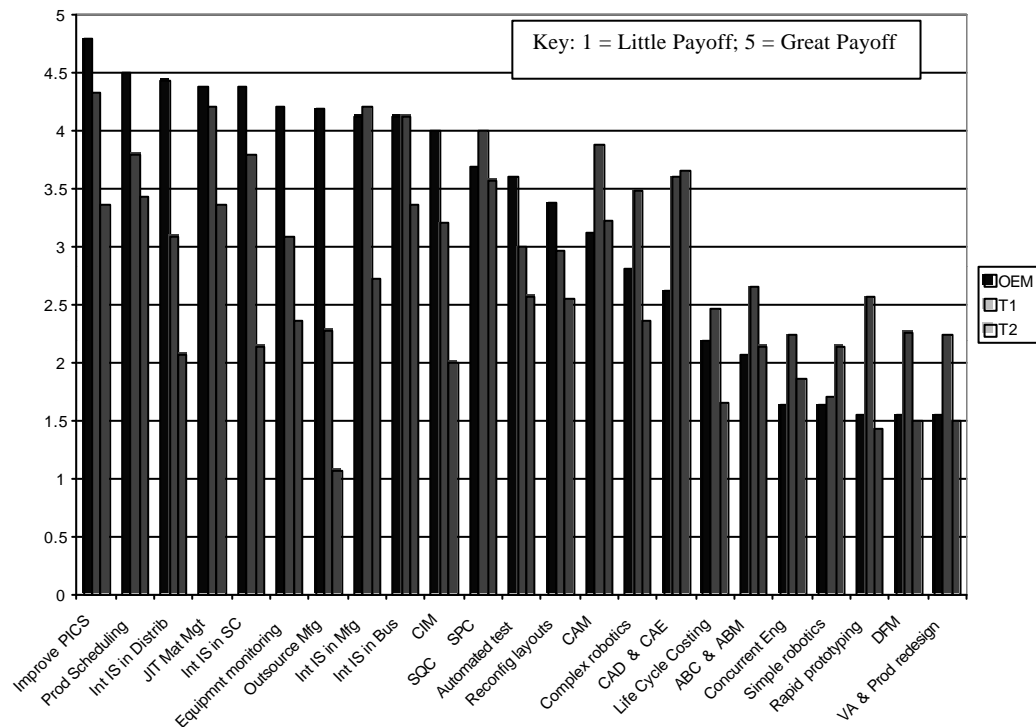
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Figure 13: Past Payoff Ranked by T2s



Future emphasis ranks are also shown in bar charts below, Figures 14 to 16.

Figure 14: Future Emphasis Ranked by OEMs



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Figure 15: Future Emphasis Ranked by T1s

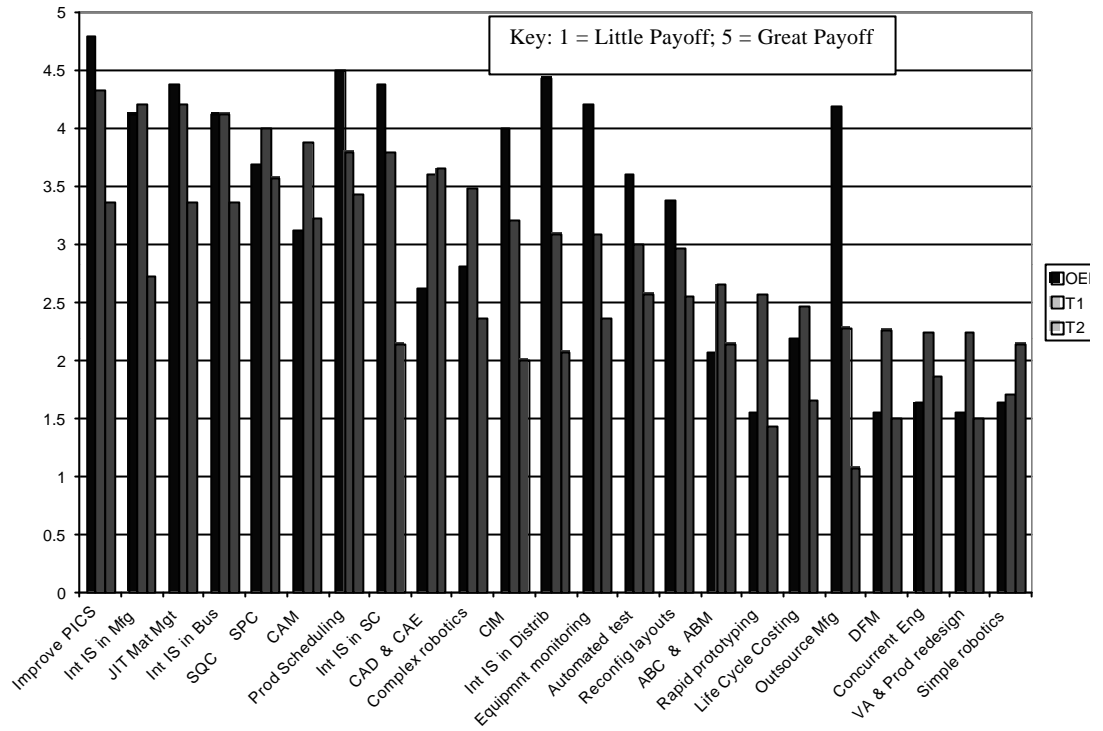
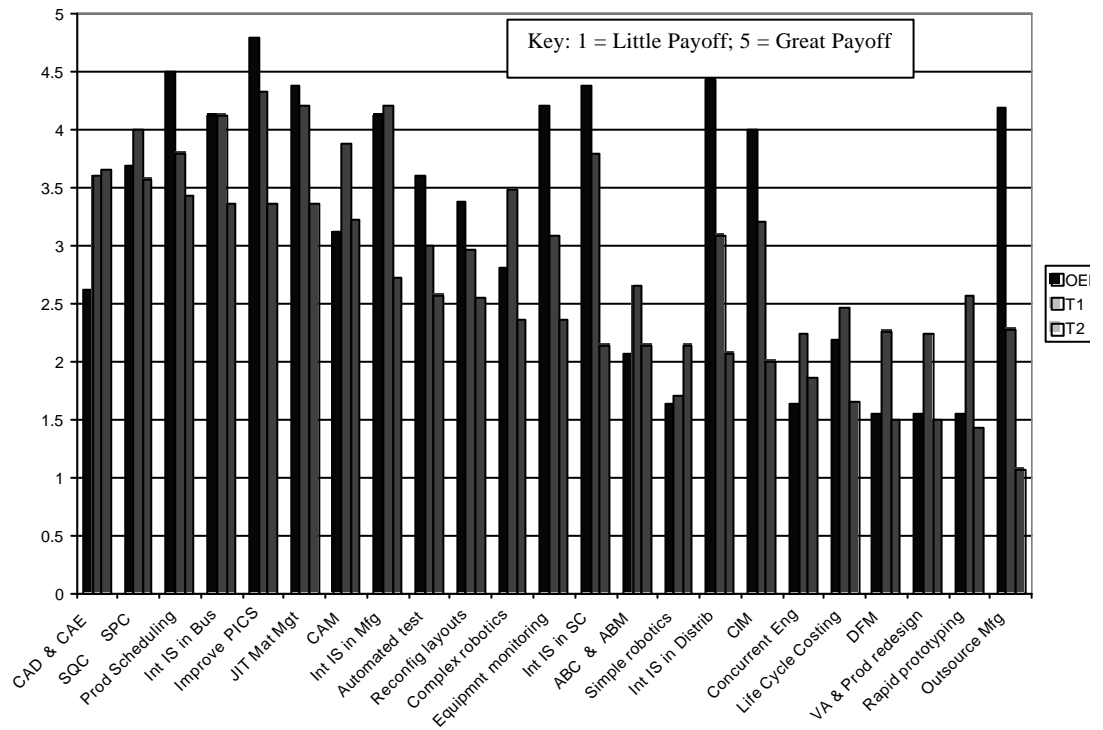


Figure 16: Future Emphasis Ranked by T2s



The lower ratings given by T2s may indicate lower confidence in their ability to implement or afford these thrusts. This is speculation, but it is interesting that in all but their top ranking thrust (CAD and CAE), T2s yield a lower average rating than OEMs and T1s.

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These figures (14 to 16) give an indication of problems arising from different priorities and stages of development in using ICTs. A clear difference of priorities is apparent: note the position of integrating information systems with distributors and with suppliers – these are ranked as per Table 8:

Table 8: Apparent Priority Differences in the Supply Chain

Place in Supply Chain	Integrating information systems		
	With distributors	With suppliers	Within the business unit
OEMs	3	5	9
T1s	12	8	4
T2s	16	13	4

The table indicates that OEMs are considerably more advanced in their thinking. T1s and T2s are giving priority to integration within their own companies rather than the supply chain.

Finally, another way of looking at the plans of the auto sector with respect to ICT applications is to view the gap between the rating given to future emphasis and past payoff. Figure 18 shows this, ranked according to the OEM gap. The gap can be interpreted as an indication of what is desired compared to what has been experienced. Big gaps tend to indicate high concern or aspiration relative to past reality.

Figure 17: Future Emphasis less Past Payoff Gap Ranked by OEMs

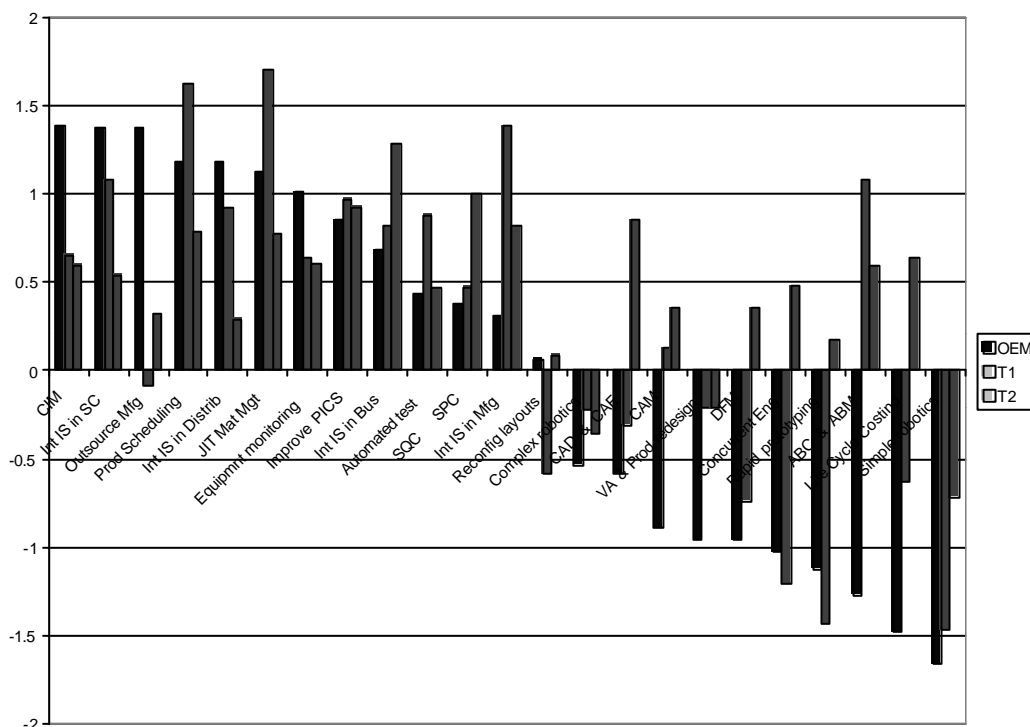


Table 9 below is similar to Table 8 above, but this time based on the ranking of gap size. The pattern portrayed by the tables is similar, though Table 9 is a little more encouraging for OEMs relative to T1s: they both indicate high concern for integration in the supply chain. This table confirms that T2s remain pre-occupied with internal rather than supply chain issues.

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Table 9: Supply Chain Priority Differences Based on Future Emphasis and Past Payoff Ratings

Place in Supply Chain	Integrating information systems		
	With distributors	With suppliers	Within the business unit
OEMs	5	2	9
T1s	7	5	9
T2s	18	12	1

9 Concluding Comments

In excess of 50 people in the SA automotive sector gave generously of their time to participate in this report. This response itself speaks of their concern to see coherence and effectiveness in the use of ICTs in their sector. These people are knowledgeable of their sector and the use of ICTs. It is thus important to give heed to their concerns, first among them supply chain standards and integration, relationship management, and training needs.

The sector itself is taking these areas seriously. It is clear that ICT suppliers and government can also play an important role in supporting the stability and growth of the industry, connecting it to the global industry, and developing opportunities for the future.

Appendix A

Automobile Sector-Specific Questions

1. Manufacturing companies use ICT in a variety of improvement programs or activities in order to enhance their competitiveness.

On the left-hand scale, indicate the extent of payoff resulting from these applications in the past two years. If an application has not been emphasised at all in the past two years, circle 0 (for N/E, not emphasised).

On the right-hand scale, *indicate the relative degree of emphasis you believe will place on each application over the next two years*.

Note that if you circle the same number for two items, it implies that the two items are of approximately equal payoff (or future emphasis).

<i>Relative Payoff Last Two Years</i>		ICT APPLICATION AREA	<i>Degree of Emphasis Next Two Years</i>	
<i>Little (N/E)Payoff</i>	<i>Great Payoff</i>		<i>No Emphasis</i>	<i>Great Emphasis</i>
<i>Facility/Process</i>				
0	1 2 3 4 5	Simple pick & place robots	1	2 3 4 5
0	1 2 3 4 5	Complex robotic systems	1	2 3 4 5
<i>Factory/Plant</i>				
0	1 2 3 4 5	Reconfiguring plant layouts	1	2 3 4 5
0	1 2 3 4 5	Equipment monitoring for maintenance purposes	1	2 3 4 5
<i>Quality</i>				
0	1 2 3 4 5	Automated inspection / testing	1	2 3 4 5
0	1 2 3 4 5	Statistical quality control (SQC) or statistical process control (SPC)	1	2 3 4 5
<i>Design</i>				
0	1 2 3 4 5	Rapid prototyping	1	2 3 4 5
0	1 2 3 4 5	Value analysis/product redesign	1	2 3 4 5
0	1 2 3 4 5	Design for manufacture (DFM)	1	2 3 4 5
0	1 2 3 4 5	Concurrent engineering	1	2 3 4 5
<i>Information Technology</i>				
0	1 2 3 4 5	Computer- aided manufacturing (CAM)	1	2 3 4 5
0	1 2 3 4 5	Computer- aided design (CAD) and/or computer- aided engineering(CAE)	1	2 3 4 5
0	1 2 3 4 5	Improved production- inventory control systems (e.g. MRP)	1	2 3 4 5
0	1 2 3 4 5	Computer integrated manufacturing (CIM)	1	2 3 4 5
0	1 2 3 4 5	Production scheduling	1	2 3 4 5

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<i>Relative Payoff</i>					<i>Degree of Emphasis</i>										
<i>Last Two Years</i>					<i>Next Two Years</i>										
<i>Little</i>		<i>Great</i>			ICT APPLICATION					<i>No</i>		<i>Great</i>			
<i>(N/E)Payoff</i>		<i>Payoff</i>			AREA					<i>Emphasis</i>		<i>Emphasis</i>			
<i>Linkage with Others for</i>															
					Integrating information systems										
0	1	2	3	4	5	within manufacturing					1	2	3	4	5
					Integrating information systems										
0	1	2	3	4	5	across functions within the business unit					1	2	3	4	5
					Integrating information systems										
0	1	2	3	4	5	with suppliers (supply chain integration)					1	2	3	4	5
					Integrating information systems										
0	1	2	3	4	5	with distributors (distribution chain integration)					1	2	3	4	5
					Outsourcing manufacturing										
0	1	2	3	4	5	(subcontracting parts of manufacturing processes)					1	2	3	4	5
0	1	2	3	4	5	Just-in-time materials management					1	2	3	4	5
<i>Cost</i>															
					Life cycle costing										
0	1	2	3	4	5	Activity based costing/management					1	2	3	4	5
					(ABC/ABM)										
0	1	2	3	4	5						1	2	3	4	5
<i>Any other application</i>															
					Others (please describe) _____										
0	1	2	3	4	5						1	2	3	4	5
					Others (please describe) _____										
0	1	2	3	4	5						1	2	3	4	5

2.

a) Please describe in your own words **the single most effective ICT application** that your business unit implemented **in the last two years**.

b) Please describe in your own words **the single most important ICT application** that your business unit plans to implement **in the next two years**.