

**The 21st Century Supply Chain**  
*The Changing Roles, Responsibilities and  
Relationships in the Automotive Industry*

**Michael S. Flynn**  
**Bruce M. Belzowski**

*Office for the Study of  
Automotive Transportation,  
The University of Michigan  
Transportation  
Research Institute*

**Bram Bluestein**  
**Michael Ger**  
**Manfred Tuerks**  
**John Waraniak**

*A.T. Kearney, Inc.  
Global Automotive Practice*

Copyright 1996,  
A.T. Kearney, Inc.

All rights reserved.  
No part of this work may be  
reproduced in any form  
without written permission  
from the publisher.

## TABLE OF CONTENTS

<b>Abstract</b>	<b>v</b>
<b>Acknowledgments</b>	<b>vii</b>
<b>A changing roadmap</b>	<b>1</b>
<b>Executive summary</b>	<b>2</b>
<b>Market and global drivers</b>	<b>5</b>
North American market expectations	5
Sources of automotive business growth	6
Vehicle consumption patterns	7
Global opportunities	8
Global competitive risks	10
<b>New perspectives on roles</b>	<b>13</b>
Changing roles	13
Industry structure	14
Customer criteria for selecting suppliers	15
Supplier criteria for selecting customers	17
Customer-supplier reciprocal selection	20
<b>Responsibilities</b>	<b>22</b>
Task responsibility	22
Transfer of task responsibility	23
Responsibility for coordinating activities	24
<b>Relationships</b>	<b>27</b>
Changing dimensions	27
Model relationships	28
Relational barriers	29
Ethics	30
<b>Conclusion</b>	<b>32</b>
<b>Research methods</b>	<b>33</b>
Survey sample	33
Analytic sample	33
Questionnaire framework and development	34
Interviewees	35
Interview framework and development	35
Analytic framework and decisions	36
<b>Sponsors</b>	<b>38</b>



## ABSTRACT

This study analyzes the changing structure of the North American automotive industry. It focuses on key market and industry drivers and comprehensively examines shifts within the industry's structure of roles, responsibilities and relationships from 1985 to 2005.

These analyses and findings are based on a major survey and interview investigation of senior executives in the North American automotive industry. In addition to exploring traditional factors such as company size and product, the research highlights the company's primary role (assembler, system integrator, direct supplier and indirect supplier), and reveals that industry participants, driven by competition and globalization, are reassessing their fundamental roles, responsibilities and relationships within the automotive value chain. They are in the midst of a period of substantial structural change — a change that is even forcing alterations in their primary roles.

Drawing from their experiences, we found that companies will rely more and more on diverging criteria in selecting customers and suppliers. This will be the case as some attributes become specific to particular roles while other

attributes characterize the entire value chain. Responsibility will shift along the chain, with system integrators assuming especially critical technical and coordination functions. Shared activities will grow and operational practices between assemblers and suppliers will become more efficient. But many traditional business practices characteristic of old relationships will persist. And there is a need for more formalized rules or ethical standards to govern these new and developing relationships.

The findings also suggest that the new relationships and responsibility transfers are developing unevenly and may result in more of a shared, high responsibility system than observers expect. Executives with different functional responsibilities at companies with different roles have disparate views on the pace and importance of these changes. This implies that discontinuities and interruptions are slowing the industry change process and restricting its potential benefits.

This report discusses the changes in these relationships and structures, the ways in which the changes affect the industry's future direction and defines the success requirements for its participants.



## ACKNOWLEDGMENTS



The members of the A.T. Kearney and OSAT team would like to thank the industry thought leaders who participated in the study. The team is especially grateful to the members of the advisory board whose invaluable contribution of time and ideas were essential to the high quality of the study.

### Advisory Board

#### Ed Buker

Vice President and General Manager  
Wiring Systems  
United Technologies Automotive

#### John Camp

Sales and Marketing Group  
Nippondenso America Inc.

#### Gary W. Dickinson

President and CEO  
Delco Electronics Corporation

#### Michael W. Doherty

Tower Automotive Inc.

#### John T. Eby

Retired  
Ford Motor Company

#### Norm F. Ehlers

Retired  
Ford Motor Company

#### Alan Johnson

President, World-Wide Manufacturing  
Operations  
Federal-Mogul Corporation

#### Edward J. Kobetich

Executive Engineer  
Toyota Technical Center, U.S.A., Inc.

#### Elliot Lehman

Co-Chairman, Emeritus  
Fel-Pro Incorporated

#### David Nelson

Sr. Executive Vice President, Purchasing  
Honda of America Manufacturing, Inc.

#### Robert Oswald

President and COO  
Robert Bosch Corporation

#### Alfred H. Peterson

Chairman of the Board, Peterson Spring  
Peterson American Corporation

#### Bernard I. Robertson

Vice President and General Manager  
Chrysler Corporation

#### James E. Taylor

Vehicle Line Executive  
General Motors Corporation

#### John E. Utley

Senior Vice President, Varity Corporation  
Chairman, Kelsey-Hayes Company

#### Don Walker

President and CEO  
Magna International Inc.

#### Kenneth L. Way

Chairman and CEO  
Lear Seating Corporation

### A.T. Kearney team members

The project was managed by John Waraniak and Michael Ger of A.T. Kearney's Southfield office, with significant contributions from Tony Altermatt, Mary Beins, Chris Bridgeman, Tom Clark and Jeff McNish, and support and guidance from Manfred Tuerks, head of the global automotive practice, and Bram Bluestein, who leads the practice in North America.

### OSAT team members

The project was managed by Michael Flynn and Bruce Belzowski with significant contributions from Eric Budnik, Lee Burge, David Cole, Jack Cragen, Jeff Davis and David Graham.





## A CHANGING ROADMAP

During the last few decades, the North American automotive industry has become increasingly complex. Only 25 years ago, competition in the North American market was effectively limited to three highly vertically integrated major vehicle assemblers. Since then, competition has expanded dramatically as imports reached record levels through the 1980s and new entrant assemblers (foreign-owned operations in North America) have achieved ever higher production within North America in the 1990s.

This intensified competition benefits consumers as it enhances product value and restrains price increases while fostering broader vehicle and accessory offerings. Competition also benefits automotive assemblers and suppliers as it pressures the entire production chain to purge waste and to search for competitive advantage — a process that can only yield improvement.

Similarly, the value chain, the foundation of production, has become more complex. Gone are the days when automakers manufactured the majority of parts in a vehicle. Today's vehicles are increasingly composed of parts provided by a network of suppliers ranging in size from small companies with just a few employees to billion dollar corporations with more than 10,000 employees. And they represent a microcosm of manufacturing spanning finished materials from metals to plastics and fibers; processes from metal stamping to polymer injector molding; products from springs to electronics; and services from design to prototype.

Analysts regularly examine the automotive industry at the manufacturing and vehicle assembler level but pay less attention to relationships between assemblers and suppliers and the relationships among suppliers. *The 21st Century Supply Chain: The Changing Roles, Responsibilities and Relationships in the Automotive Industry* examines these relationships. A joint project conducted by the Office for the Study of Automotive Transportation (OSAT) at The University of Michigan Transportation Research Institute and A.T. Kearney, Inc., the study presents the changing allocation of roles and responsibilities across the industry and the implications of these changes for the industry participants.

The study was conducted to confirm the team's belief that changes in these relationships and the structures between companies indicate the industry's future direction and will define the requirements for its participants' success. The study analyzes key market and industry drivers and comprehensively examines how the structure of roles, responsibilities and relationships within the industry is changing over the 1985 to 2005 time period.

Numerous models of the supplier industry exist, emphasizing the supplier's technical capability, how directly the supplier's product moves to the assembler, the complexity or value of that product and the exclusiveness of the relationship. Supplier respondents were asked to identify themselves as one of three types: (1) system integrators that engineer and provide the modules or systems of parts and components to assemblers; (2) direct or first tier suppliers that provide materials, parts and components directly to vehicle assembly operations; or (3) indirect or second-tier suppliers that provide automotive goods to other suppliers and only indirectly to assemblers. In reality, many suppliers are "mixed types," so they were asked for their primary identification.

Every care has been taken to ensure that the research findings selected for inclusion in this report are robust and reliable. To this end, the team relied on appropriate methods and statistical tools to guide its selection of material. Nevertheless, these results are subject to statistical probabilities and chances of error. While the report notes instances in which analytic findings and results vary across different types of companies, readers should always be alert to the specific implications and limitations of these results to their own companies or business situations.

research

standards

**EXECUTIVE SUMMARY**

An alliance was formed by A.T. Kearney and OSAT to assess the changing roles, responsibilities and relationships shaping the future of the automotive industry. The strength of this alliance reflects the wide experience of A.T. Kearney's automotive consultants and OSAT's thorough understanding of the industry.

This joint effort has yielded a database of high quality information on assembler and supplier responses to a detailed survey questionnaire, analysis of these data and more than two dozen interviews with key industry executives. An industry advisory board, selected to provide insights into the actual practices and likely future developments in the automotive industry, guided all these activities and the interpretations of the research results. The advisory board is comprised of a cross-section of industry leaders with varying functional responsibilities at traditional and new entrant assemblers and suppliers. This final report presents the team's initial findings based on complete study data and builds on our preliminary report, *The Next Revolution: A Study of Changing Roles, Responsibilities and Relationships in the Automotive Industry*.

**Key Findings**

The study findings reveal that industry participants have reassessed and continue to reassess their fundamental roles, responsibilities and relationships within the automotive value chain. This value chain continues to experience an extraordinary degree of change. Among the key findings:

- In the next decade, companies defining themselves primarily as system integrators will more than double; companies defining themselves as indirect suppliers will increase marginally; and companies defining themselves primarily as direct suppliers will decrease substantially.
- Although companies expect substantial tiering and role restructuring over the next decade, the key elements facilitating this restructuring — system-level integration, effective communication and modular sourcing — are developing somewhat slowly.
- In the year 2005, assemblers and suppliers acting as customers will rely on a wider and more critical range of criteria for selecting suppliers than they do today. These will vary somewhat across the supply chain as assemblers and system integrators reveal a changing emphasis on technical capabilities as selection criteria.
- Suppliers rely on a wider, but still somewhat unstructured set of customer-selection criteria than they have in the past or do today. They are beginning to differentiate their customer strategies, at least in the functional areas. System integrators view themselves as technically capable and as such are less concerned over time with the technical capabilities of their customers. Direct and indirect suppliers report increasing concern about these customer strengths over time.
- Reciprocal selections of customers and suppliers suggest that some responsibilities will only be allocated to specific types of companies, while many will be shared across the entire chain. However, some criteria are more important in supplier selection than in customer selection. A few of these may indicate weakness in the value chain.
- The transfer of direct task responsibilities from assemblers to suppliers from 1985 to 2005 is approximately halfway complete in 1995. Although the findings indicate that the transfer may result in more of a shared, high-responsibility system than observers expect. Significantly, the purchasing functions at assemblers and system integrators report this transfer at a much earlier stage than do the marketing functions at system integrators and indirect suppliers. This means that connecting functions between companies have markedly different views of where this process is now or is headed in 2005.
- The transfer of coordination responsibilities from assemblers to suppliers will vary depending on the tasks, with strategic and regulatory activities remaining

with assemblers. There is less agreement on how task responsibility is and will be allocated for product development — a critical coordination arena especially for regulatory compliance.

- New relationships are developing unevenly. Shared activities will grow and operational practices between assemblers and suppliers will become more efficient. But many traditional business practices characteristic of old relationships will persist.
- Today's industry is characterized by two different relationship models: selection and development. The selection model has lower turnover and more mutual learning relationships. The development model emphasizes more open-ended but performance contingent relationships. It is unclear which will become dominant.
- While all respondents report the need for more formalized ethical standards, system integrators and direct suppliers often voice a more urgent need than do assemblers and indirect suppliers.

In addition to these key findings, respondents gave the following assessments of automotive market factors and drivers:

- Compound annual growth in the North American market is predicted to be about 1 percent between 1994 and 2005 with a continuing U.S. market shift from passenger car to light-truck sales. Thus, even though the Big Three assemblers expect to lose light-truck share they expect to gain light-truck sales.
- U.S. vehicle sales are expected to account for a higher share of their growth through 2005 than either Canadian or Mexican vehicle sales, and only modest sales growth is expected from exports.
- They believe consumer buying patterns will shift as leasing replaces the traditional outright purchase of motor vehicles (both new and used). But differences in vehicle markets will remain for some time among Canada, Mexico and the United States.
- North America, particularly the United States, is rated as very attractive for the automotive business. Nevertheless, the respondents plan to take advantage of emerging global opportunities and invest more outside North America over the coming decade. This is especially true for system integrators. Overall, respondents report that their biggest opportunities outside North America will be China, Brazil, Germany and Japan.
- They view the North American automotive industry as quite competitive, noting that increased globalization activities and attitudes are required to remain competitive. They report that globalization is moving along fairly evenly, if a bit slowly, across numerous dimensions. Japan is expected to remain the most serious competitive threat to the North American industry a decade from now, followed by South Korea, Germany and China.

### Research Methodology

The methodology developed by the A.T. Kearney and OSAT team ensures that each step of the research process results in meaningful data and information. The team carefully considered the design and execution of the entire research enterprise to ensure that the objectives of the study were met.

The team recognized at the outset that two kinds of critical information would be required. First, information that accurately reflects the industry's view of its situation, challenges and likely futures forms the bedrock of the overall analysis. Second, information drawn from industry participants who have exceptional insight and understanding (whether due to talent, perspective or position) provides invaluable guidance for interpretation and understanding of the industry results.

Researchers typically rely on different methods for gathering these two kinds of information, since the methods appropriate to one type are usually not appropriate for the other. Thus, the study's data or information collection activities fell naturally into two phases: the survey questionnaire phase to elicit overall industry views and the interview phase to develop and enhance team understanding of those views.

The team developed and followed procedures to ensure complete confidentiality of the data and to prevent publication of information on individual respondents or companies.

### **Survey questionnaire phase**

A.T. Kearney and OSAT designed a questionnaire encompassing numerous subject areas and mailed it to assemblers, production suppliers and engineering services organizations. The data presented here are from questionnaires returned by September 1995. The questionnaire elicited the views of the North American automotive industry, including its Canadian, Mexican and U.S. constituencies. It concerns the changing tasks, roles and responsibilities developing in the industry and the implications of these changes on industry participants. The following are the major sections of the questionnaire:

- Participant/company information
- Relationships between vehicle assemblers and suppliers
- Change issues and challenges
- Risks and opportunities
- Competitive performance
- Changes in industry environment

The A.T. Kearney and OSAT team compiled and analyzed these data throughout the fall of 1995 and early winter of 1996, examining and testing the patterns of industry views and ways in which these views might vary across the different kinds of industry participants.

### **Interview Phase**

The A.T. Kearney and OSAT team conducted interviews and analyses throughout the fall of 1995 and early winter of 1996. These interviews with industry thought leaders from various functional areas in the assembler and supplier arenas lasted from one to two hours. Although these interviews were somewhat tailored to the assemblers and the suppliers, the major sections of the interview were:

- Changes required for competitiveness of the company, industry and value chain
- *Strategic influence* of customers and suppliers
- Decisions to pursue business with customers

- Changes in relationships with customers and/or suppliers and drivers of these changes
- Development and selection models for customer-supplier relationships
- Changes in responsibility allocation across the industry

The team transcribed each interview and compiled and coded the information. The interview results amplify and extend the survey findings.

### **Final Report**

This report represents the final formal activity of the team. However, the unusually rich and complex nature of these data may lead to further pieces and presentations.

The report is divided into three sections. In the first section, we present information and analyses on market developments and other drivers shaping the industry's structure as we move into the next century. In the second section, we reveal findings of each of the major topics of the study — roles, responsibilities and relationships — and discuss their implications. In the final section, we more fully describe and discuss our research methods. This section also describes how we measured the various factors of our analyses: four company attributes (country, role, product and size) and two individual respondent characteristics (rank and functional area of responsibility).

**MARKET AND GLOBAL DRIVERS**

Today's North American automotive industry is experiencing rapid and explosive change. It is restructuring, seeking to eliminate waste while adding value to the critical skills and competencies required for competitive survival into the next century.

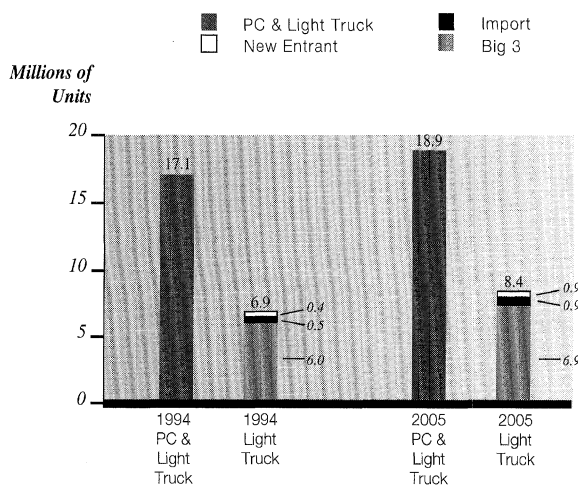
Two important shifts in the automotive business environment — competition and globalization — are forcing this restructuring. Competition has intensified and is raising business risks and undercutting the old certainties, including the certainty of profitable survival. This competition is fostered largely by the continuing globalization of the North American automotive market during the past 25 years, a process in turn sparked by the rapid emergence of new automotive industries and markets around the globe.

**North American market expectations**

**Findings**

Respondents forecast slow growth in the North American light-vehicle market, including passenger cars and light-duty trucks (pick ups, vans and recreational vehicles). They expect automotive sales to increase from just over 17 million units in 1994 to almost 19 million units by 2005, a compound annual growth rate just under 1 percent (figure 1).

FIGURE 1  
NORTH AMERICAN SALES OF PASSENGER CARS AND LIGHT-DUTY TRUCKS



Smaller companies, whether measured by sales or number of employees, expect somewhat higher sales than larger companies (an additional 750,000 vehicles).

The survey results suggest that the market's segmentation will continue to shift from traditional passenger cars to light-duty trucks, as passenger car share of the total market falls from 60 percent in 1994 to under 56 percent in 2005. Overall, survey participants expect passenger car shares of the Big Three, new entrants and importers to shift a bit, with Big Three and importers each losing about one point to new entrants.

Respondents forecast greater changes in the light-truck segment. They expect the Big Three share to fall from 87 percent to 82 percent and new entrants to capture four points and imports to capture one point from the traditional domestic producers.<sup>1</sup>

Suppliers are much more optimistic about their own sales growth. They report expected sales increases of roughly 80 percent to both their automaker customers and other suppliers and growth in excess of 70 percent in the aftermarket. In contrast, they expect nonautomotive sales to increase by about one-third.

**Implications**

Growth in the North American vehicle market of 1 percent is indeed low. It is only half of the 2 percent growth rate typically forecast for mature markets. These results may somewhat reflect the industry's sharp disappointment with Mexico, as sales plummeted there this past winter. It is interesting that study participants expect to see further shifts from passenger cars to light trucks. Just a few years ago the industry was wondering how long it would be before consumers returned to the traditional vehicle of choice — the passenger car.

These sales-share expectations have interesting implications. The Big Three, despite losing share in both the passenger car and light-truck markets, will capture more than half the expected market growth. This is because of the shift to light trucks, where respondents still expect a much higher Big Three share in 2005 (82 percent) than their share in pas-

<sup>1</sup> Our preliminary analysis suggested that assemblers expect more light-truck share to go to imports than do suppliers, a plausible difference in light of the assemblers' likely higher awareness of the expanding light-truck segment in Europe and the development of so many new vans. However, this preliminary difference has not held for the full sample.

senger cars (58 percent). Similarly, this same shift will somewhat restrain new entrants' sales growth, since their expected performance in passenger cars (approaching 24 percent) is stronger than in light trucks (11 percent). This is also the case for importers' market growth since their share is close to 19 percent in passenger cars but less than 8 percent in light trucks.

The Big Three automakers currently hold 87 percent of the light-truck market. It should surprise no one that respondents expect this share to fall. As the light-truck share of sales increases, other assemblers will find it more important to compete strongly in this segment. With so many assemblers developing entries, Big Three dominance is unlikely to continue. In fact, respondents may be underestimating the Big Three's loss of share. Moreover, the increasing private use of light trucks, combined with substantial commercial use of passenger cars, raises questions about the importance of this traditional product distinction in today's market.

These estimates of market growth and the sales shift to light trucks indicate that the Big Three will sell nearly 900,000 more light trucks in 2005 than in 1994. This is the output of nearly four assembly plants at current capacity levels. If the Big Three achieve 1994 share levels in 2005, they will capture nearly another half-million sales (the output of two plants) and hence supplier business. So there will be relative if not absolute loss of production volumes.

If suppliers and automakers expect slow growth in the North American vehicle market, how do suppliers expect to achieve their own sales growth estimates? The study now addresses this question.

### Sources of automotive business growth

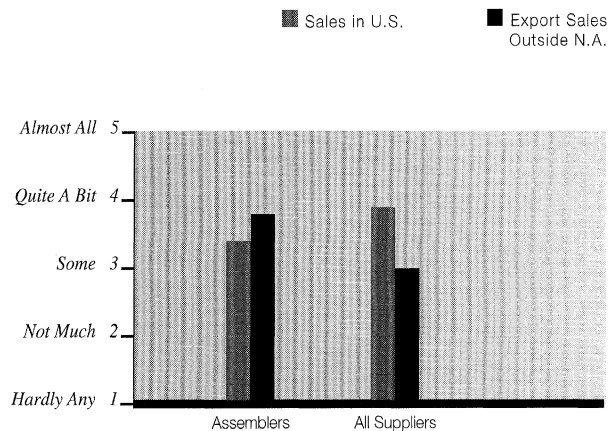
#### Findings

Within North America, the share of sales growth from expanded vehicle sales in the U.S. market is projected to be higher than growth from vehicle sales in Canada or Mexico. Respondents from the three countries have differing views on the contribution of vehicle sales in Mexico. For instance, Mexican respondents rate Mexican sales as a moderate source of growth, U.S. respondents rate Mexican sales somewhat lower, and Canadians rate Mexican sales even lower.

Suppliers see their customers' increased U.S. vehicle sales as an even more important source of sales growth than do assemblers. Assemblers and suppliers also differ about the promise of vehicle exports as a source of sales growth — assemblers rate exports nearly a full scale point higher (figure 2). Finally, adding new customers and new product lines are seen as moderate sources of growth.

There are some important differences between large and small suppliers in the ways they expect to increase their sales. Small suppliers expect more growth from their customers' U.S. vehicle sales, outsourcing from higher tier suppliers and adding new customers. Large suppliers expect more sales growth from outsourcing by vehicle manufacturers.

FIGURE 2  
SOURCES OF GROWTH: U.S. SALES VS. EXPORTS



#### Implications

These findings are somewhat puzzling. Respondents expect substantial growth in their own companies' sales yet see U.S. vehicle sales as the single most important source of that growth. This is their expectation even though any increase in U.S. vehicle sales is going to be quite small according to their own views of overall market development and growth. Further, they view two classic strategies for a mature market as, at most, moderate sources of growth: capture share (adding new customers or increasing the share of business at existing customers) or expand the market (new products). It is not clear from their responses how they expect to achieve sales growth.

Perhaps the different types of suppliers are pursuing different sales growth strategies that are masked in these overall results. For instance, it appears that different attributions by small and large suppliers reflect different strategies. But these strategic differences do not completely eliminate the puzzle since both large and small suppliers report that small increases in U.S. vehicle sales will be the major source of their own dramatic increases.

It may be that the estimates for company sales growth are derived from a somewhat skewed sample of our respondents since many companies refuse to release sales data. These often are smaller, privately held companies. This is the case here; sales estimates are skewed to the larger companies, and their responses, if less reliant than small suppliers on U.S. vehicle sales, reveal little in the way of a compensating strategy to achieve substantial growth.

We are tempted to speculate that suppliers expect today's levels of fierce competition to continue (leading to an inevitable shake out in the industry) and that survivors will be larger companies. Or they may anticipate increased sourcing by new entrant assemblers. However, the moderate levels of growth attributed to adding new customers and increased share of customer business lend little credence to either of these interpretations. Unfortunately, results such as these are not always completely consistent and clear. In this instance, the survey data appears to provide a better indication of the patterns of expectations than the reasons for these patterns.

There are at least two possible explanations for the different views on Mexican sales as a source of growth. First, Mexican respondents may simply believe the market will grow more than Canadian and U.S. respondents do. Second, all the respondents may believe that Mexican suppliers will be the primary beneficiaries of even modest levels of growth in Mexico. It is impossible to say which of these explanations account for the difference in expectations. In either case, the difference is real and Mexican suppliers see local vehicle sales growth as a more promising source of growth than do their northern neighbors.

Finally, the moderate reliance on exports across the supplier industry suggests that suppliers might be too conservative in taking advantage of global market opportunities.

## Vehicle consumption patterns

### Findings

Respondents expect some change in the industry's customer profile by 2005. They expect sales of new vehicles to female buyers and racial/ethnic minority customers to rise. (Assemblers forecast this increase to be even stronger than do suppliers.) They predict the sale of new vehicles to low income buyers will likely decrease in the face of price increases. And they expect little overall change for sales of new vehicles to both first-time buyers and those under the age of 30. But there are national differences in their expectations.<sup>2</sup> For first-time buyers and those under the age of 30, Mexican respondents expect increased shares; Canadian respondents expect small decreases; and U.S. respondents fall in between although a bit closer to Mexican respondents' expectations.

Moreover, the traditional outright purchase of new vehicles will continue to recede in the face of increased leasing, especially in Canada and the United States. Leasing will also expand in the used vehicle market, again primarily in the two northern NAFTA nations. Respondents see two changes in the important entry-level segment. First, the ratio of light trucks to passenger cars will increase, and second, the ratio of used to new vehicle sales in the entry segment will increase in Canada and the United States (figure 3).

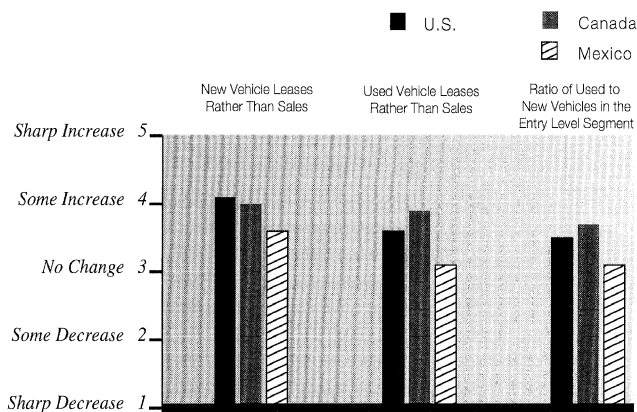
Finally, Mexican respondents expect a substantial increase in the average vehicle model life; Canadian respondents expect less upscaling of the vehicle mix; and all respondents anticipate an increase in the industry's reliance on customized designs.

### Implications

Whether the share of female and minority buyers will actually increase, or whether these data represent a belated recognition of developments already underway over the past few decades, is an open question. Regardless, the industry's customer base has become or likely will become more heterogeneous over the next decade. Vehicle function and style must reflect these changing customer patterns. The automotive industry should move aggressively to capitalize on the sales growth opportunities offered by these developments.

<sup>2</sup> Three of the national differences reported in this section are significant at the .06 level, and one at the .09 level. They are included because the pattern of national differences across the items is consistent, and the combined probability of error is arguably lower than that represented by the series of independent tests.

FIGURE 3  
VEHICLE CONSUMPTION PATTERNS IN NAFTA COUNTRIES



Affordability will probably continue to be a major industry challenge in the 1990s and beyond. For the past two decades real wages have declined for much of the workforce. This wage decline pressures low income buyers who find it increasingly difficult to finance new vehicle purchases and has been a driver for leasing new vehicles, buying used vehicles and even leasing used vehicles. The automotive market may become more like the housing market in which there is a large number of used products and more consumers select the rental option.

Global competition and reductions in product development cycle times provide today's automakers with an increased number of product offerings. As a result, they must be able to differentiate their products through innovative designs and target smaller, niche markets with products that reflect their increasingly heterogeneous customers' needs and preferences. These trends may force companies to offer more customized designs. Or they may decide to restrict design proliferation to ensure the best value to price ratio. Only time will tell which of these, if either, becomes the dominant approach.

The differences among the respondents within the three national vehicle markets are useful reminders that the three North American consumer markets do indeed differ. The extensive integration of the Canadian and U.S. automotive industries since the Autopact in 1965, and the anticipated addition of the Mexican industry (through NAFTA) into a substantially integrated North American industry, should not

blur the fact that the markets differ now and will for some time in the future. While the differences between the automotive markets in the United States and Canada may be small, their common differences from Mexico remain large.

Mexico's market, like its economy, is still developing and is far from the mature stage of its NAFTA neighbors. The country expects more first-time and young buyers, which is appropriate in a growing market. And it expects to see lower rates of lease substitution for new and used vehicle sales (nontraditional tools are perhaps not yet required for a market that is taking off rather than leveling off). Similarly, Mexico's economic growth suggests that the ratio of new to used vehicles in the entry segment will expand for some years to come, rather than the reverse patterns that are expected in Canada and the United States. This makes sense as the expanding pool of more affluent first-time buyers increasingly shops for entry-level new cars. The strong expectation for increased vehicle life in Mexico probably reflects expectations for increased access to newer, more durable vehicles and an improved transportation and maintenance infrastructure.

### Global opportunities

#### Findings

The globalization of the industry simultaneously presents opportunities and risks. What opportunities does the North American industry see for itself and how are these opportunities distributed across North America and beyond?

There are still differences among the constituent national industries in North America reflecting the strength of their national economies and each industry's particular traditions and experiences. Assemblers and suppliers rate the United States as having the most attractive opportunities in North America for producing and marketing vehicles and parts in 2005. The U.S. ranks about one-half a scale point ahead of Mexico, which leads Canada by roughly the same amount. Overall, the ratings suggest that each of the North American countries may be a bit more attractive for parts production than for vehicle assembly, and more attractive as parts markets than vehicle markets.

Respondents were asked to nominate up to three locations outside North America that they feel will offer their



FIGURE 4  
ATTRACTIVE PRODUCTION OPPORTUNITIES

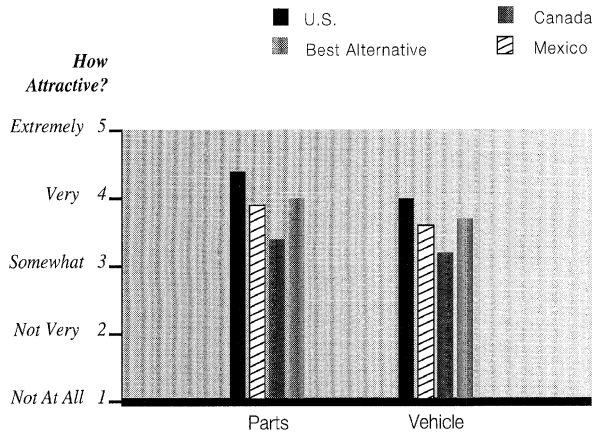
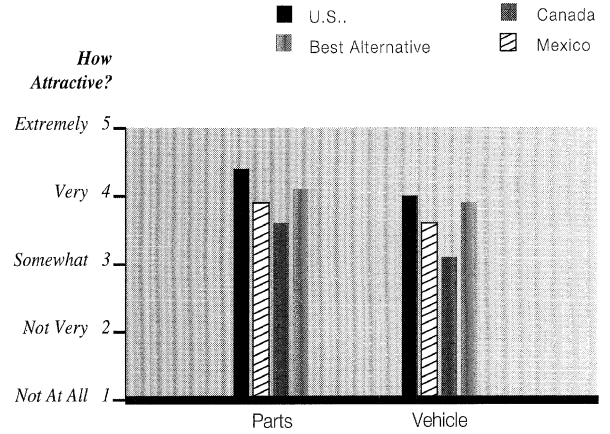


FIGURE 5  
ATTRACTIVE MARKET OPPORTUNITIES



companies the most attractive automotive opportunities for 2005. They nominated China most often, distantly followed by Brazil, Germany and Japan. The ratings suggest that China and Brazil are attractive for vehicles and parts and as markets and production sites. For part production, they are rated at roughly the same level as Mexico. For vehicle production, China's attractiveness is the same as the United States'. For marketing parts, China and Brazil fall between Mexico and the United States. And for vehicle market, China is rated as an even more attractive opportunity than the United States. Japan and Germany are attractive as parts markets at about the same level as Mexico.

Examination of respondents' attractiveness ratings for their first choice country outside North America (regardless of which country) suggests that these "best alternatives" are roughly equivalent to Mexico for part and vehicle production options and as parts markets. They are a bit more attractive than Mexico as vehicle markets (figures 4 and 5).

How global is the North American industry now and how far has it come on its path to globalization? Participants believe the industry is a bit behind schedule on its globalization journey from 1985 to 2005. Globalization of its assembly, market, supply and technical bases is just about midway between one-quarter and halfway in 1995, lagging the time schedule (figure 6). In fact, assemblers estimate that globalization of the technical base is about one-quarter of the way while system integrators believe it is just behind schedule.

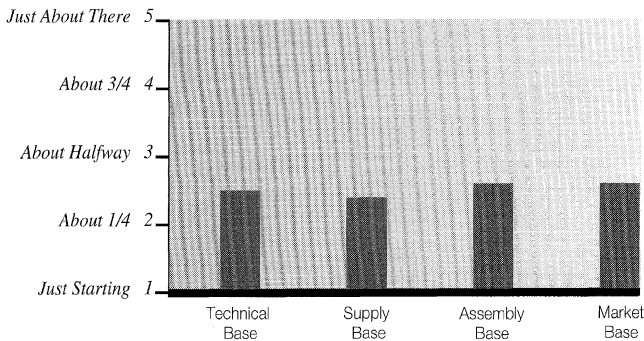
Both assembler and supplier interviewees suggest that globalization, both in approaching global markets and in developing global cultures and/or habits of thought, remains a major challenge to the North American industry. Some suppliers note that assemblers' insistence on sourcing locally often undercuts suppliers' economies of scale as well as requires capital investment or alliance formation. Both assemblers and suppliers say industry engineers and executives lack the mind set and language skills to move from Michigan to Malaysia.

Do North American automotive companies plan to expand their production presence beyond today's levels by 2005, both within and beyond North America? The answer is a qualified yes, within North America. Suppliers that describe themselves as system integrators report substantial increases, while other suppliers and assemblers report smaller increases. All report larger increases in production locations beyond North America, although again, system integrators report an even more substantial increase than the others. All expect an increase in affiliated operations outside North America.

**Implications**

The ratings suggest that North America is expected to remain an attractive automotive environment a decade down the road. This differs a bit from ratings a decade or so ago when North America's attractiveness as a production loca-

FIGURE 6  
GLOBALIZATION MOVING ALONG EVENLY ... IF A BIT SLOWLY



tion was rated as roughly equal to its attractiveness as a market. The weakened dollar and the recent economic turmoil and uncertainty in Mexico may have enhanced the relative attractiveness of U.S. production within the region.

Opportunities outside North America seem concentrated in two established markets and two growth markets and are roughly comparable to those offered by Mexico. Brazil and China offer attractive opportunities for both production and market, while Germany's more developed automotive economy is primarily attractive as a parts market. Japan is reasonably attractive as a market opportunity and somewhat surprisingly (in view of the much publicized strong yen) as a production location. Perhaps this reflects the extent to which the North American industry now shares companies with the Japanese industry. Survey results are always somewhat time-bound. More recent findings might differ from these since Brazil and China have altered their investment policies and India now seems to be more on the industry's radar screen. This kind of uncertainty is one of the risks of globalization.

North American suppliers that see themselves as already filling a system integrator role intend to expand production aggressively both within and beyond North America. Other suppliers and the assemblers report little expansion within North America by 2005, but more aggressive expansion abroad. Clearly, the industry at all levels recognizes that it must establish a global production base. Globalization forces new dynamics and factors into traditional site location decisions. An attractive overall assessment probably carries

less weight than when such decisions were restricted to one or just a few markets. While North America may be more attractive, the dynamics of today's industry demand that production be located in other countries.

**Global competitive risks**

**Findings**

If globalization offers opportunities to the North American industry, it also brings increasing challenges from other national and regional industries. As the automotive production chain becomes more tightly linked and interdependent, the success of any one company becomes more contingent on the success of its own particular linkages with suppliers and customers. How well then does the North American industry compare with its international rivals?

Respondents nominated up to three countries they feel will represent the greatest competitive challenge to the North American industry by the year 2005. Japan had the most nominations and the highest average rank, followed by South Korea, Germany and China. As discussed earlier, respondents also nominated three of these countries as attractive opportunities (figure 7).

Respondents feel that today's North American industry is globally competitive, rating it "quite" competitive on R&D, design and marketing. They rated it between "somewhat" and "quite" competitive on supplier selection and development, process and product engineering, manufacturing, and sales and service.<sup>3</sup> Assemblers rated the industry somewhat less competitive than suppliers in three core functions: R&D, process engineering and manufacturing. Interviewees most frequently identified cost issues as the dominant challenges to the industry's competitive improvement. This was followed by restructuring the industry value chain and improving the manufacturer-supplier relationships that forge it.

Survey participants rated their own company's competitive strengths across functional areas such as R&D and supplier selection, and management and performance dimensions such as program management and cost reduction. They rated their current performance as about average or a bit better and believe they will improve to become "quite" competitive by 2005. Suppliers' product markets influence

<sup>3</sup> Design includes the general styling, layout and geometry, while product engineering includes detailing, prototyping and validation. While these lines blur in many companies, the functional tasks are still separable.

most of their performance ratings, revealing that electrical/electronic and material suppliers see themselves as a bit more competitive today and changing less by 2005; powertrain suppliers see themselves as a bit less competitive today and changing more by 2005; and interior and chassis parts and components suppliers typically fall between the others.

The interviewees identified the major internal changes their companies must make to remain competitive. They most often mention globalizing activities and attitudes, followed closely by adjusting to the changes demanded by industry restructuring. These include meeting increased functional responsibilities, meeting often diverging customer requirements and developing appropriate alliances. The major barriers to competitiveness appear to be rooted in individual and organizational resistance to change, difficulties in communicating and working together, and insufficient human resources, both in number of people and skills.

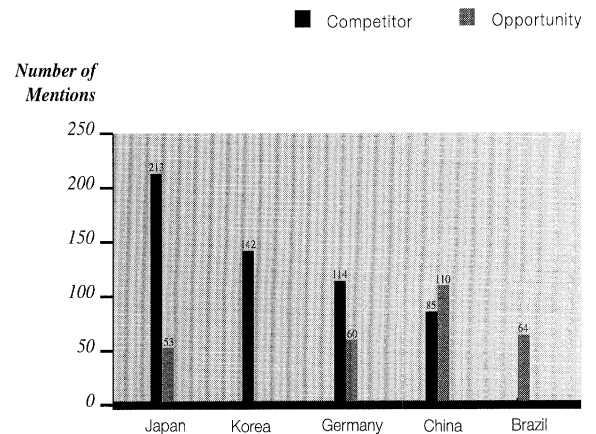
Participants report that competition based on a number of performance dimensions is generally developing on schedule, and the industry is about halfway along its change course from 1985 to 2005. In fact, competition based on cost and quality are right between half and three-quarters of the way. Of all 32 items, cost and quality are reported to be the furthest ahead of schedule.

However, the various industry roles view this situation somewhat differently. System integrators report the industry is furthest ahead of schedule on cost and quality followed by direct and indirect suppliers. Assemblers rate these two dimensions as just about on schedule. These differences emerged in the interviews as well. Five of six assemblers interviewed mentioned cost reduction and four mentioned quality improvement as important changes for the North American industry to be competitive in 2005. And of 20 suppliers interviewed, seven mentioned cost reduction and just one identified quality improvement.

**Implications**

Respondents gave Japan the largest number of votes as the strongest competitor to North America in 2005. While not unexpected, it is surprising that they cast more votes for South Korea than for Germany and named China such a strong competitive contender.

FIGURE 7  
TOP FOUR GLOBAL COMPETITORS/OPPORTUNITIES



It is not surprising that South Korea is rated a strong contender, but it is surprising that South Korea soundly outpaced Germany and completely dominated the other European producer nations. Why did the respondents pay so little attention to France, Italy and the United Kingdom? When rating China, the respondents not only rated it ahead of these same established producers in Europe, but see China as dominant among emerging producers. Why did the respondents pay so little attention to Brazil or Thailand? It may be that a changing, perhaps coalescing, view of global competitive challenges is emerging.

The respondents' self-ratings of their own competitiveness across their core activities are interesting. These ratings seem to be a bit more realistic than those from the past as the industry now sees itself as competitive, though not the dominant force it once was. Moreover, the ratings are somewhat differentiated and identify three activities — R&D, design and marketing — as relatively stronger than its competitors. The discrepancy in the assembler and supplier ratings of R&D, process engineering and manufacturing, while not huge, may be important. The assemblers, based on their typically more global experience, may have a better sense of these comparisons than the average supplier and thus may identify areas for somewhat greater concern.

The image of a more humble and realistic industry carries over to participants' ratings of their own companies' competitive strengths. The ratings for 1995 are typically

about average, while fairly substantial improvement is anticipated by 2005. Industry surveys in the past often revealed a tendency for companies to rate themselves well above average.

Perceptions may differ for numerous reasons. They can differ from biases that lead to different views of the same event. Or they can be the result of true differences in actual events. It is difficult to determine which perception is due to bias and which to reality, but in either case, differences can generate heated disputes. The different perceptions of respondents to how far along the industry is in changing to competition based on quality and cost is such a case.

Suppliers believe the industry is past the halfway point (some see it well beyond the halfway point) while assemblers see it about on schedule. The interviews reveal a similar pattern as assemblers more often mention cost and quality as important targets for competitive improvement.

Many suppliers made it clear in the interviews that they believe they have stepped up to the plate in the areas of cost and quality. They feel they are making important gains and have pulled ahead of many assemblers. Assemblers believe many suppliers are deluding themselves and face much stiffer quality and cost challenges down the road. Whether these differences reflect different perceptions or different realities is important, but probably unresolvable. It is still important to recognize this as an area in which the perceptions are substantially different and therefore likely that suppliers and manufacturers are not communicating effectively.

## NEW PERSPECTIVES ON ROLES

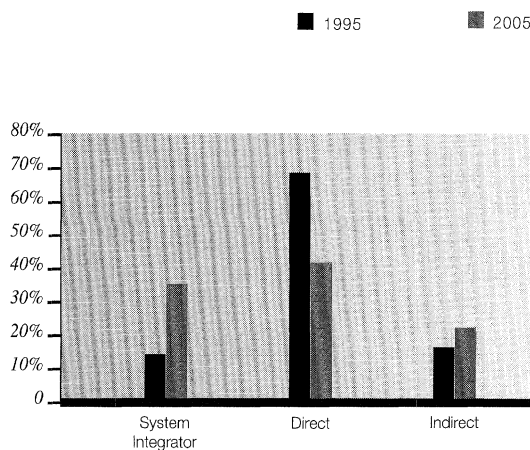
The automotive industry is experiencing an intense period of role redefinition as it moves from a fairly simple and undifferentiated structure of assemblers and suppliers to one in which important differences exist among suppliers. We see three major types of supplier roles emerging. We believe these roles will bear different responsibilities and require distinct relationships if the industry is to evolve as a true supply chain structure and maintain or improve its competitive performance. The three roles are: (1) system integrators that engineer and provide the modules or systems of parts and components to assemblers; (2) direct or first tier suppliers that provide materials, parts and components directly to vehicle assembly operations; or (3) indirect or second-tier suppliers that provide automotive goods to other suppliers and only indirectly to assemblers.

### Changing roles

#### Findings

The distribution of supplier roles will change substantially over the next decade. Suppliers whose primary role is system integrator will increase from 14 percent to 36 percent of the total while indirect suppliers will increase from 17 percent to 23 percent. Direct suppliers will fall from 69 percent to 42 percent (figure 8).

FIGURE 8  
SUPPLIER ROLES: PRESENT AND FUTURE



Moreover, 34 percent of all supplier respondents report that their companies will change their primary roles in the industry over the next decade. By 2005, 30 percent of today's direct suppliers report they will be system integrators and 14 percent predict they will be indirect suppliers.

We also asked interviewees to identify which industry role currently contributes the most to overall industry performance: assemblers, system integrators, suppliers of parts and components direct to assembly, or indirect suppliers whose immediate customers are other suppliers. None identified assemblers, one identified direct suppliers, two chose indirect suppliers and 13 said system integrators contribute the most to overall industry performance. This question elicited more consensus than any other. The focus on the system integrator confirms the key importance of the industry's continuing role restructuring.

However, the interviews revealed a lack of consensus in exactly what the system integrator role is and will be. Respondents generally related it to company size, position in the supply chain or its assumption of technical tasks and to product complexity in different combinations and with varying emphasis.

#### Implications

These data suggest that a more complex industry structure is evolving in which assemblers will cap a production chain composed of at least three distinct roles: system integrators, direct suppliers and indirect suppliers. This restructuring should rationalize resources along the industry value chain by shifting various support activities such as design, engineering, R&D and purchasing from assemblers to system integrators. Reducing the overhead expenditures associated with such activities should lower break-even production quantities and allow assemblers to serve smaller niche markets profitably. This new industry structure should also permit assemblers to focus their energies on their own core processes such as product planning, vehicle engineering and marketing as they relinquish less central activities to suppliers.

While numerous companies will likely find their primary roles changing, the brunt of the changes are likely to

hit today's direct suppliers. Many suppliers will try to expand their activities to play system integrator roles, while some will pursue opportunities available to indirect suppliers. It is important to recognize that the costs as well as benefits of these roles will differ. For some companies, avoiding the additional burdens and costs of the system integrator role and opting for an indirect supplier role will be the strategically wise choice. Indeed, our interviews suggest that suppliers are considering the more complex aspects of these future roles. Some express no interest in taking on the burdens of system integrators or direct suppliers.

This evolving supply chain structure will not be completely neat and fixed. There clearly is ambiguity in the distinctions among the terms "systems," "modules," "components" and "parts." While a single fastener may be readily distinguishable from an engine, distinctions among the constituent elements of the vehicle are less clear. Many suppliers will be "mixed types." But it will be their primary identification that will largely determine their future strategies, decisions and activities. Size alone will not determine the supplier's role. Some very large material companies will function as indirect suppliers, while some smaller specialty suppliers will be system integrators. Moreover, relationships will probably not all be simple bilateral linkages along the chain. As one assembler noted, assemblers will have to bargain directly with some material suppliers because smaller suppliers lack the necessary bargaining power. Nor will any one type of supplier capture all the benefits since there will be responsibilities and rewards throughout the supply chain.

System integrators will be defined more by their functions and capabilities than by their exact location in the flow of product to assemblers. While the supplier that ships the final system to the assembler may be the "system assembler," the true system integrator may be encountered much earlier in the product flow, perhaps at the electronic component stage or even at the initial material stage. The key characteristic will be the assumption of responsibility for the execution of most technical tasks in the product chain and the coordination of the chain's technical and operational performance.

## Industry structure

### Findings

What will the industry structure look like in the year 2005? How many different types of suppliers will the industry need and support? While no one can give absolute answers to these questions, the survey participants' answers provide us with pertinent information and insights into the future structure of the automotive industry.

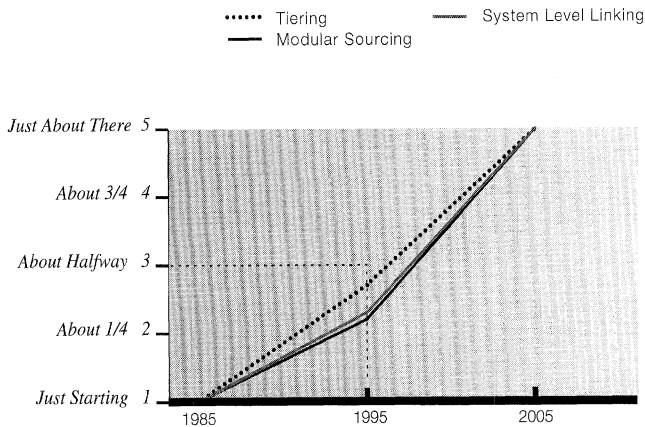
Assemblers estimate that about 60 module or system integrators and about 300 to 330 direct suppliers will be supplying them in 2005. Suppliers agree with these estimates, with the exception that indirect suppliers estimate that assemblers will require only about half the number of direct suppliers. An appropriate target for purchases from participants outside North America is 16 percent.<sup>4</sup>

Approaching the production chain from the other end, participants estimate the preferred targets for each of the three types of suppliers. As we move up the production chain from indirect to system integrators, the preferable number of customers falls from 21 to 6 and the number of products/projects drops from 57 to 14. The number of suppliers per product/project falls less dramatically, from 14 to 11, as does the percentage of sales that should be exported beyond North America, which falls from 20 percent to 16 percent.

The industry in 1995 is chronologically halfway between 1985 to 2005. Respondents report some unevenness in how closely the pace of structural change parallels this time scale, with some changes lagging (about one-quarter of the way) and others about on schedule (about halfway). The respondents view few changes as ahead of schedule. These results indicate that the industry is just short of halfway to the level of tiering in the supply base that will characterize the industry in 2005. However, it is closer to one-quarter of the way, and thus a bit behind schedule, to 2005's level of communicating effectively across all tiers of the supplier industry to the assemblers. The industry has changed just a bit more than a quarter of the total change anticipated by 2005 in linking or integrating its efforts at a systems level, and in its implementation of modular sourcing (figure 9).

<sup>4</sup> Assemblers may report a higher figure (at 21 percent) than do suppliers (at 15 percent). This difference is statistically reliable at the .07 level, rather than the .05 level typically used throughout the report.

FIGURE 9  
HOW FAR HAS THE INDUSTRY COME ON ITS JOURNEY?



### Implications

Currently there are about 15 light-vehicle assemblers active in North America, including distinct ownership/control arrangements but excluding multiple plant sites. Assuming this number will be the same in 2005, we multiply 15 by the 60 system integrators each will need and divide this number by the six customers the system integrators should serve. Our answer suggests that the North American industry will require 150 system integrators in 2005, which is a number close to published estimates. Similarly, if these 15 assemblers average 300 direct suppliers, subject to direct suppliers' preferred target of 10 customers, then the industry in 2005 will require 450 direct suppliers, which is also close to published estimates. These figures ignore the fact that suppliers will continue to play multiple roles and supply each other, and imply that restructuring will be accomplished by 2005 rather than extend into the future. Nevertheless, the figures suggest that substantial reallocation of roles is likely, perhaps exceeding even the expectations respondents reported in the prior section.

As discussed earlier, companies in the industry expect restructuring of their primary roles over the next decade. However, some elements or enablers of the role changes are moving a bit slowly and the pattern of change is somewhat uneven. In particular, three key changes associated with the development of the system integrator role — system level integration, effective communication and modular sourcing

— are a bit behind schedule. It is difficult to imagine how a tiered structure will develop without these important elements.

The most important implication of these results may be that the industry is likely to face a greater degree of change between now and 2005 than it has experienced since 1985. The next decade may therefore be a period of intensified restructuring and realignment, rather than a period of consolidation and solidification, since the industry must still complete the bulk of its change.

### Customer criteria for selecting suppliers

#### Findings

Numerous factors or criteria may play a role in a customer's decision to select a supplier and the importance of these factors may change over time. Survey respondents rated 25 such selection criteria including supplier capabilities, opportunities, competitive assets and relationship advantages. In 1985, only four selection criteria — global presence, system integration capability, management of human resources and management of own supply base — were "not very" important. Four criteria — manufacturing capability, short-term price, delivery reliability and quality — were "quite" important. The rest of the criteria were in that middle ground of "somewhat" important.

For 1995, participants' ratings moved to a higher plateau of importance. All criteria exceed the "not very" important level: seven are "somewhat" important, 17 are "quite" important and quality is "extremely" important. Today's expanding list of important criteria is reflected in the assembler interviews as well. Six respondents generated a list of 11 criteria and each was mentioned at least twice. They ranged from cost and quality (four mentions) to supplier "will-do" attitude (three mentions) to R&D capability (two mentions).

Looking to the future, survey respondents expect one criterion — status as exclusive customer — to linger at the "somewhat" important level. They expect 20 criteria in the "quite" important range and four criteria — quality, design/engineering services, price reduction commitment and delivery reliability — to be "extremely" important (figure 10).

FIGURE 10  
INCREASING COMPLEXITY OF SUPPLIER SELECTION CRITERIA:  
RANGE AND NUMBER OF CRITERIA

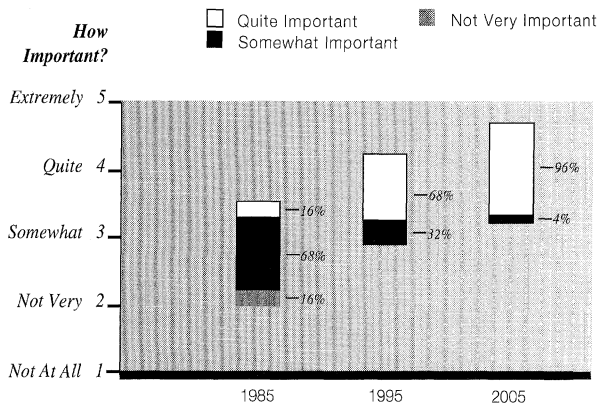
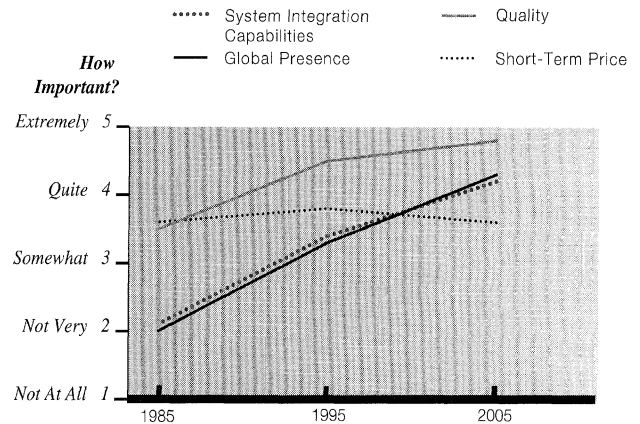


FIGURE 11  
EXEMPLAR CUSTOMER CRITERIA FOR SELECTING SUPPLIERS



In general, the increase in rated importance across these criteria is substantial, averaging more than one-and-one-quarter scale points from 1985 through 2005. The importance of these criteria has reportedly increased more on average from 1985 to 1995 than it will from 1995 to 2005.

The different roles show a few reliable differences in the ratings of these selection factors over time. All four types of companies report substantially increased importance for supplier design and engineering services. However, over time, assemblers and system integrators switch their emphasis. Assemblers considered supplier design and engineering services more important than did the other roles in 1985, and less than the others for 2005. System integrators move from considering such services less important to more important than the other roles. Assemblers and system integrators consider systems integration capability more important than do direct and indirect suppliers. They again switch their emphasis relative to each other: Assemblers rated this capability most important in 1985; system integrators rate it most important today and for 2005.

The importance of proximity to customer plants diverges over time. Assemblers report the sharpest increase, and by 2005 rate it more important than suppliers.<sup>5</sup> On the other hand, assemblers and suppliers converge over time on the importance of supplier financial strength. Assemblers report supplier financial strength more important than do suppliers for 1985 and 1995, but all agree on its importance for 2005. Finally, suppliers disagree among themselves

about the developing importance of their responsiveness to special circumstances. System integrators assign responsiveness to special circumstances less importance than direct and indirect suppliers for 1985; direct suppliers estimate responsiveness to special circumstances somewhat lower than the other two for 1995 and 2005.

These criteria for selecting suppliers generated the most frequent differences among respondents of different corporate rank or titles. Regardless of time period, higher ranking respondents tended to view numerous criteria as less important to customers than did lower ranking respondents. These criteria include: R&D, agility, delivery reliability, financial strength, management of own supply base, proximity of plants to customer and long-term commitment to the relationship.<sup>6</sup> The pattern reversed for supplier proprietary technology. Higher ranking respondents viewed supplier proprietary technology as more important than lower ranking respondents.

**Implications**

There are a number of noteworthy aspects to these results on selection criteria. Since survival requires securing customers, suppliers need to attend to their customers' selection criteria. These criteria indicate the relative importance of various supplier capabilities, attributes and roles to their customers. The data reveal three changing patterns of role importance in the evolving industry structure.

First, customers have a clearer understanding of the role their suppliers play in the value chain. In the past,

<sup>5</sup> These views perhaps contribute to suppliers' concerns about following their customers abroad, discussed earlier.  
<sup>6</sup> Commitment to a price reduction and responsiveness to special circumstances also follow this pattern, but at .06, just fail to reach the .05 level.



fewer dimensions carried weight in the selection process. In 1985, there were fewer supplier attributes and capabilities that were important to customers, whether assemblers or other suppliers. Thus a few criteria dominated the decision and outstanding performance in one area, such as price, would often suffice to secure a contract with an assembler or supplier customer. This strategy is certainly less likely to succeed today because customers have a clearer understanding of the critical and more complex role their suppliers play in the value chain. If, as the respondents' suggest, price remains quite important today and for 2005, it will be joined in the future by even more criteria. And supplier selection will become even more complex, determined by complex and differentiated criteria reflecting supplier role performance.

Second, some selection criteria reveal substantial change over the rated time periods. In some cases, this change reflects general developments in the industry. For example, the supplier's global presence moves from "not very" important in 1985 to "somewhat" important today and is expected to reach "quite" important by 2005. This is not surprising in light of the increased importance of globalization for the North American industry. Nor is it surprising that a supplier's management of human resources follows the same path since the industry has become more cognizant of the importance of human resources in the competitive equation.

In other cases, such shifts reflect the industry's restructuring of roles as is the case with suppliers' system integration capability (figure 11). This criterion also moves from 1985's "not very" important to today's "somewhat" important and to tomorrow's "quite" important. However, the relative importance of this capability depends on the respondent's company's role. Direct and indirect suppliers view this capability as less important than do system integrators and assemblers. This makes sense in terms of the conventional expectations about responsibility for performance of this function. The same change pattern holds for a supplier's management of its own supply base. This reflects the industry's increased recognition that it is structured in a long-linked production or value chain, and certain functions must be replicated at particular points along the chain.

Third, the supplier-selection process is perhaps moving a bit ahead of schedule. That is, respondents' reports of

importance over time imply that for most criteria the change from 1985 to today has been greater than the change predicted from today through 2005. This is quite different from the pattern for some aspects of the industry structure discussed previously.

The frequent differences in the ratings of the importance of these criteria depending on the title or position of the respondent are intriguing and potentially problematic. The differences may suggest that supplier leadership is somewhat out of touch with the day-to-day decisions and developments in supplier selection. This may be an important arena for companies to consider and to ascertain whether such differing views undercut their efforts to secure and serve customers.

Analysis reveals just a few differences between assemblers' reports of their criteria for selecting suppliers and suppliers' reports of their criteria for selecting their own suppliers. The industry today may be too complex for differences simply between assemblers and suppliers to reveal much information. After all, today's system integrators may share more characteristics and concerns with assemblers than with direct and indirect suppliers. Indeed, these analyses reveal that differences within the supplier community occur about as frequently as differences between suppliers and assemblers.

## **Supplier criteria for selecting customers**

### **Findings**

North American suppliers have the opportunity to choose customers much more today than they did in the past. The number of potential assembler customers encourages (and sometimes requires) them to select from among the available assemblers. If system integrators on average serve six customers, and direct suppliers serve 10, then there are now too many assemblers in North America for the typical supplier to serve them all. That means the criteria suppliers use to choose their customers form an interesting domain for inquiry. The results of such an investigation can provide useful business information.

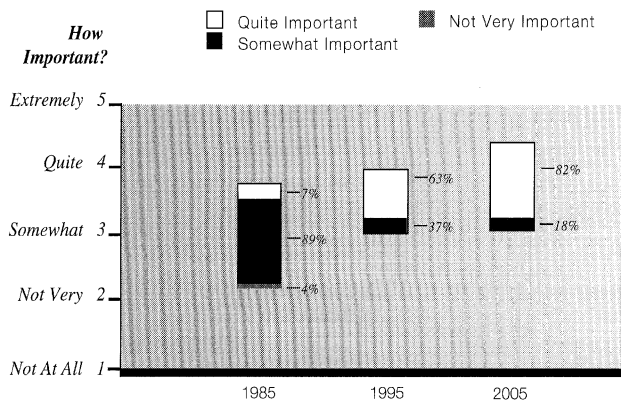
As is the case with assemblers selecting suppliers, numerous factors or criteria may play a role in any one supplier's decision to select a customer. The importance of these factors may change over time. Respondents rated 27 selection criteria including customer capabilities, opportuni-

ties, demands, competitive assets and relationship advantages. In 1985, only one selection criterion — opportunity for global business — was not very important, 24 fell into the somewhat important category and only two — volumes per part number and prior relationship — were quite important.

For 1995, survey participants rated no criteria as unimportant, 10 as somewhat important and 17 as quite important. For 2005, four criteria are somewhat important, 22 are quite important and one — long-term commitment — is rated as extremely important. Interviewees most often identified relationship fit, both strategically and operationally, followed by business growth potential (especially globally) and business volumes as the most critical customer-selection factors. The 20 suppliers identified 15 such criteria in their 60 selections, mirroring the survey data picture of an increasingly complex decision (figure 12).

From 1985 to 2005, the data show that the increase in importance across these criteria is moderate, averaging about eight-tenths of a scale point. The implied change in the importance of the criteria has been greater from 1985 to 1995 than it is expected to be from 1995 to 2005.

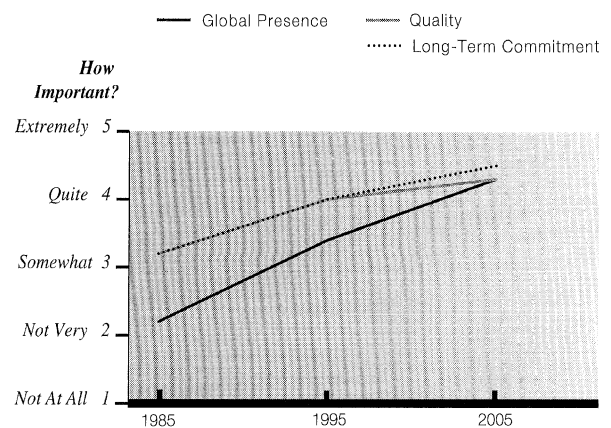
FIGURE 12  
INCREASING COMPLEXITY OF CUSTOMER SELECTION CRITERIA:  
RANGE AND NUMBER OF CRITERIA



The assemblers named the criteria they think direct suppliers use for selecting assemblers as customers. This provides a useful comparison with the suppliers' own reports. Only three of the 27 criteria reveal statistically reli-

able differences between direct suppliers and assemblers. For two of these items the statistical difference reflects the eventual convergence of ratings that are quite different in 1985. Differences in the importance of price-reduction commitment converge for 1995, and differences in the importance of long-term commitment to the relationship for 2005. However, assemblers simply appear to believe that proximity to plants is more important than do suppliers. Again, as in assessing its role in selecting suppliers, they rate proximity increasingly more important as a selection factor.

FIGURE 13  
EXEMPLAR SUPPLIER CRITERIA FOR SELECTING CUSTOMERS



Again, there were a number of reliable differences in how different types of companies rated these selection factors. These differences were more common in comparisons of different types of suppliers than in comparisons between the assemblers and the suppliers. Seven of the 27 criteria reveal substantial differences and five of these are concentrated in the customer's functional capabilities (figure 13).

Overall, there is little change in the importance of customer design and customer engineering capabilities from 1985 through 2005. However, both system integrators and indirect suppliers make substantial changes in their ratings. But because they are in opposite directions, they cancel each other out in the aggregate. For each of these dimensions, indirect suppliers report a growing importance, increasing by nearly a full scale point. However, system integrators report

that these customer capabilities are becoming less important to them, diminishing to nearly the same extent that they increase for the indirect suppliers. For customer manufacturing and R&D capabilities, the system integrators show virtually no change from 1985 to 2005, while assemblers and direct and indirect suppliers view both capabilities as becoming more important. Finally, while all believe customer system-integration capability is now more important than in the past, and will be even more important in the future, this is much less the case for system integrators than for either direct, or especially indirect suppliers.

Demand for price-reduction commitment and proximity to plants reveal differences among industry roles in addition to those between assemblers and direct suppliers already discussed. For example, indirect suppliers report price reduction is today and will be in 2005 considerably less important than the others. And assemblers report proximity is and will be more important than do suppliers.

Some supplier interviewees commented on how their companies selected targets for their customer base. Seven suppliers indicated their companies constructed portfolios of customers and described nine criteria and considerations ranging from geographical markets and vehicle type to the mix of existing and new business.

### Implications

Selecting customers is a more complex task today than it was in the past. There are now many more assemblers producing in North America, globalization has made export opportunities more available, and many of today's suppliers perform functions that require them to purchase more products from other suppliers. If the 1960s offered the Big Three and a few suppliers as potential customers, today offers many more, and tomorrow may offer even more. Criteria for selecting customers indicate the relative importance of customer performance dimensions and functions to suppliers, and changes in the criteria suggest the changes in industry roles and structure.

First, not many customer attributes and capabilities were very important to suppliers in the past. Unlike the case of customers selecting suppliers, a process dominated by a few criteria, these data suggest a selection process that was idiosyn-

cratic; customer-selection criteria were virtually all somewhat important, with none more or less important than others.

Second, just a few of these selection criteria change as substantially over time as do many of the customer criteria for selecting suppliers discussed earlier. The customer's provision of global business opportunities moves two points on the importance scale, from not very important in 1985 to somewhat important in 1995 and reaching quite important by 2005. In only one other instance — customer's demand for a price-reduction commitment — does importance increase nearly this much.

However, nine other criteria increase a full scale point, so the customer-selection process is not simply static. Three of the nine are customer capabilities — quality, flexibility and system integration — which are more important in today's competitive environment than they may have been in the past. The other six criteria suggest the growing importance of the relationship between assembler and supplier to the overall competitiveness of the industry and its constituent companies. The six criteria — customer's long-term commitment, investments in the infrastructure to manage the relationship, management of the supply base, sharing of mutual gains, recognition of supplier contribution and demand for compliance with customer's systems — are all relational attributes rather than specific performance dimensions or assets.

Third, there is a surprising and impressive similarity between the customer-selection criteria ratings made by direct suppliers and by assemblers. Failure to find many statistical differences between assemblers and direct suppliers does not support the assertion that their views are the same. Nevertheless, it is tempting to say that assemblers understand their direct suppliers' views well. While such understanding does not imply either agreement or approval, it can be an important first step in negotiating relationships.

System integrators and other suppliers reveal contrasting views in the changing importance of various customer capabilities. This is intriguing and encouraging in terms of the successful restructuring of the industry. The ratings suggest that system integrators are taking on an array of functional responsibilities and, as a result, have declining or stable need for these capabilities from their customers. Indirect

and direct suppliers, on the other hand, have increasing need for their customers to provide these capabilities because they will shed some of their own efforts in these areas. The industry will not pay for duplicative efforts.

The customer-selection process is perhaps moving a bit ahead of schedule, as respondents' ratings imply that the change from 1985 to 1995 is greater than the change from 1995 to 2005 will likely be. However, these overall changes may be misleading since there are important differences depending on each respondent's industry role.

The preliminary report questioned whether customer-selection strategies in the industry are well developed. More complete analysis suggests that many suppliers may indeed be appropriately differentiating their strategies to the requirements of their own roles. Nevertheless, the interviews indicate that many suppliers are only beginning to wrestle with the strategic opportunities in a market that now offers some choice of customers.

### **Customer-supplier reciprocal selection**

#### **Findings**

How do these selection criteria match up? Are customers' and suppliers' lists compatible and congruent, or are they so different that serious compromises are required to establish actual relationships? To a certain extent these selection criteria, whether for customers or suppliers, are simply preferences or shopping lists that must be balanced and compromised to what is actually available. More important, they cannot be used unilaterally since a desirable customer or supplier may say no.

Fifteen selection criteria appear in the lists for customers seeking suppliers and suppliers pursuing customers. Four more criteria are arguably similar enough to merit examination.

Ten of these criteria — flexibility, financial strength, supply base management, plant proximity, balancing of risks across partners, long-term commitment, prior relationship, responsiveness to special circumstances, global activity and commitment to price reductions — are quite close in absolute rated importance and even appear to follow similar paths across the three time periods.

Nine criteria are rated differently, depending on whether the selection is targeted to a customer or a supplier. These include functional capabilities such as design and engineering, R&D and systems integration. In all instances, the relative importance of the criteria shifts and becomes more important as criteria for selecting suppliers than as criteria for selecting customers. A number of other criteria — quality, manufacturing, production and delivery, and short-term price — have always been more important for suppliers. While sharing mutual gains and exclusive relationships have always been more important for selecting customers than for selecting suppliers.

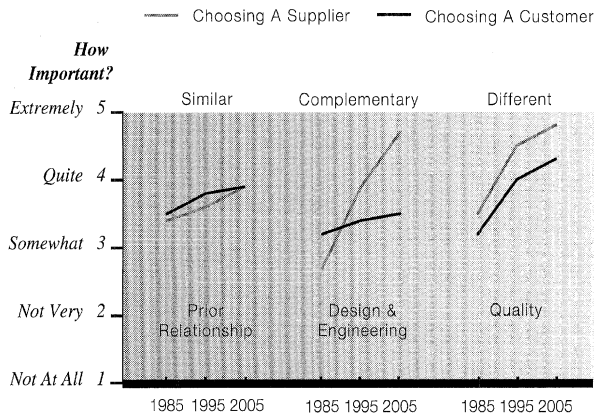
Seventeen of the common criteria for selecting customers and suppliers are moderately to strongly correlated. This means the more important the respondents believe a criterion is in one selection decision, the more important they believe it to be in the other decision. The exceptions are manufacturing and design and engineering.

#### **Implications**

Customers choose their suppliers and suppliers choose their customers. Each pursues its own set of criteria to find the most effective relationship available. The choice is meaningless, however, until it meets with a reciprocal selection. Business relationships, like all voluntary relationships, are mutual and do not begin unless the parties select each other.

The comparison of these customer-selection bases and supplier-selection bases is interesting. Most of the criteria are similar in importance regardless of whether the selection is targeted to suppliers or to customers. This similarity makes sense for characteristics that should be shared by the entire production chain. This seems to be the case for a number of these criteria, for instance, flexibility and financial strength. In some cases, the different emphasis seems to reflect reasonable differences in roles and functions along the supply chain. Thus, manufacturing competence is a more important criterion for selecting suppliers than for selecting customers. On average that may reflect the location of manufacturing activities along the chain, especially as the industry rationalizes through 2005. Over time, functional capabilities such as design and engineering, R&D and sys-

**FIGURE 14**  
**RECIPROCAL SELECTION: SOME CRITERIA FOR**  
**CHOOSING CUSTOMERS AND SUPPLIERS**



tem integration become more supplier than assembler criteria, reflecting the industry’s reallocation of these responsibilities.

In all relationships, similar and complementary needs and attributes are the usual basis for selection. The automotive industry seems to reflect these selection principles. Moreover, the similar and complementary patterns seem roughly appropriate, potentially yielding assembler-supplier pairs that will be similar in some desirable attributes and performances while dissimilar in others and hence avoiding unneeded and costly duplication.

However, some differences seem less clearly related to rational differences in performance expectations. For example, quality is rated more important in selecting suppliers than in selecting customers, yet quality seems to be a performance dimension that, like flexibility, should be shared across the entire chain. Similarly, reliable supplier delivery is rated as a more critical selection factor than manufacturers’ production schedule stability, although the latter is a key enabler of the former. Both of these comparisons raise the possibility of unintended disconnects or disruptions in the industry production chain (figure 14).

**RESPONSIBILITIES**

If industry roles are changing, it is because the allocation of the tasks and responsibilities that constitute these roles is changing across the different types of companies. The traditional patterns of responsibility for strategic, technical, operational and functional tasks are giving way to new patterns based on expertise, system cost and avoiding duplicate effort. Of course, changes as complex as these do not happen instantly, nor are they likely to proceed smoothly. It is therefore critical to understand not only where the industry is today, but also where it may be heading by 2005.

**Task responsibility**

**Finding**

Respondents report that assemblers, system integrators and direct suppliers all have high levels of responsibility for technical developmental tasks such as R&D, design, product engineering and project management. Assemblers' responsibility for process engineering is lower than system integrators' or direct suppliers', which is at the level of the other developmental tasks. Indirect suppliers have low responsibility for R&D and design but somewhat more responsibility for project management and product and process engineering (figure 15).

The pattern of task responsibility is quite different in non-technical areas. Assemblers, system integrators and direct suppliers all have high responsibility for supplier selection, while indirect suppliers have less responsibility. Marketing is primarily an assembler responsibility; it is less of a responsibility for system integrators and direct suppliers and even less for indirect suppliers. Manufacturing responsibility falls heaviest on direct suppliers, followed by system integrators and indirect suppliers. Assemblers have the least manufacturing responsibility (figure 16).

Members of the four industry roles (assemblers, system integrators, direct and indirect suppliers) hold quite different views on how responsibility is distributed. First, each role assigns itself at least as high and often higher levels of responsibility for the four technical tasks than do the others. Second, except for project management, assemblers make more highly differentiated attributions of responsibility for each technical task than do suppliers, especially indirect suppliers. Third, assemblers still see themselves as having substantially more responsibility for R&D and design than any of the suppliers have, while suppliers see assembler responsibility as comparable to that of system integrators and even other suppliers.

FIGURE 15  
ALLOCATION OF TECHNICAL RESPONSIBILITY ALONG THE 1995 VALUE CHAIN

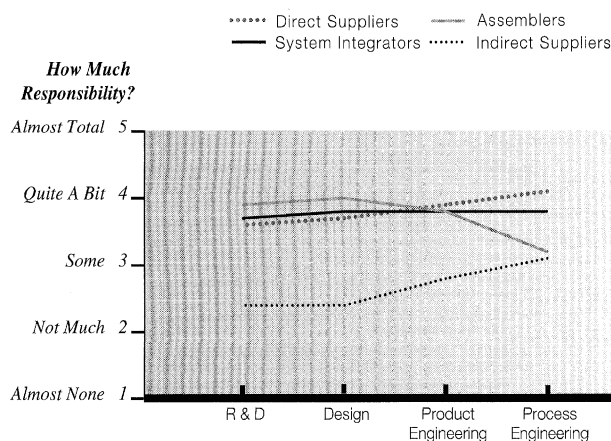
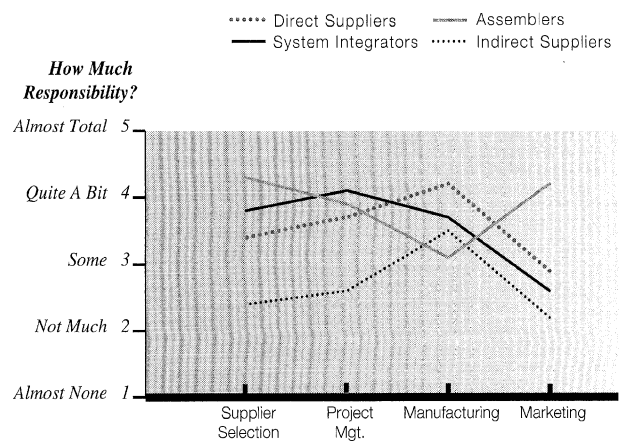


FIGURE 16  
ALLOCATION OF NON-TECHNICAL RESPONSIBILITY ALONG THE 1995 VALUE CHAIN



These patterns generally hold for manufacturing (except assemblers differentiate responsibility much less than the three types of suppliers) and supplier selection in which assemblers' self-attributed responsibility more closely matches the responsibility suppliers assign them. Finally, all agree that assemblers have the highest level of responsibility for marketing.

### Implications

These data suggest a responsibility system with four possible characteristics. First, the dividing line between levels of responsibility falls between indirect suppliers and all other roles, rather than between assemblers and suppliers or between system integrators and other suppliers. Except for process engineering and manufacturing, the respondents attribute lower responsibility for the tasks to indirect suppliers than they attribute to assemblers or the other types of suppliers.

Second, shared responsibility among assemblers, system integrators and direct suppliers suggest a clear, ordered, hierarchical division of responsibility only for marketing, which shows the traditional pattern of assemblers having the most responsibility. There is also somewhat weaker evidence that assemblers may take lead responsibility for supplier selection and direct suppliers take lead responsibility for manufacturing. Nevertheless, the overall evidence does not suggest any clearly established differential leadership role across the various functional tasks, technical or not.

Third, the attributed levels of responsibility are all rather high, especially since we ask respondents to allocate responsibility across the four industry roles. In answering this kind of question, respondents typically try to differentiate or discriminate their responses carefully across the targets. Their failure to do so here may be evidence that the industry is characterized by a relatively high responsibility system.

Fourth, there is no consensus on how the industry allocates responsibility today. Assemblers report a more differentiated responsibility system; suppliers a more shared responsibility system. Moreover, assemblers describe a system in which they have more responsibility for task performance than the system described by suppliers. This may suggest conflicts as differences in these images are negotiated in the future.

These data suggest that today's industry responsibility system is probably one of shared, high-level responsibility rather than one that clearly allocates differential responsibility across tasks to the various types of company. Such a high-level responsibility system may be appropriate when manufacturing a vehicle in which safety and quality are major concerns. It is a system, however, that may present more of a coordination challenge than a system that divides and assigns responsibilities.

### Transfer of task responsibility

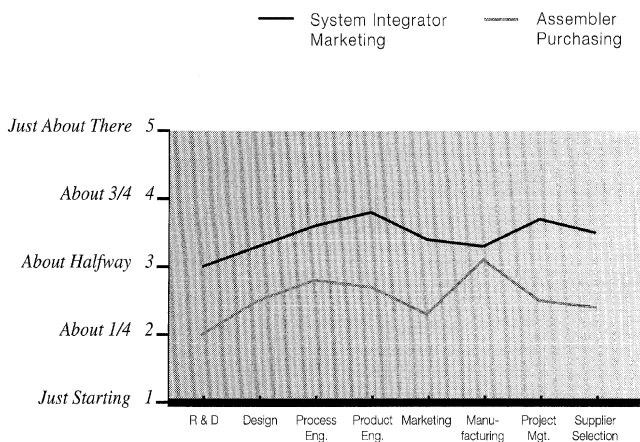
#### Findings

The conventional wisdom on the restructuring of task responsibility in the automotive industry suggests that by now there has been a substantial transfer of responsibilities from assemblers to some suppliers, notably system integrators. Is this transfer occurring for technical, developmental and functional tasks?

Survey respondents report that the transfer of responsibility from assemblers to suppliers for developmental tasks is just about on schedule (halfway), although for R&D the transfer may be a bit slow. The transfer of responsibility for other decisions and tasks, such as supplier selection and manufacturing, are just about halfway between where they were in 1985 and where respondents think they will be in 2005. Marketing is the only area in which the transfer of responsibility from assemblers to suppliers appears to be moving slowly.

Interviewees were unanimous in reporting that the industry is changing the way it allocates functional and operational responsibility along the value chain. Many of the examples they used were exactly the kind of tasks covered in the survey. However, suppliers are concerned that assemblers are continuing to maintain staff to perform the transferred tasks, thus burdening the system with needless costs. Some also observed that transferring responsibility does not always lead to improved efficiency since some suppliers simply adopt the practices of assemblers. In other instances, suppliers even hire personnel from the assemblers to perform these tasks. Suppliers feel that, to date, there may have been more transfer of responsibility for performance than transfer of the authority necessary to effect it.

FIGURE 17  
DISCONNECTS IN VIEWS OF RESPONSIBILITY TRANSFER



There were systematic and significant differences in the views of responsibility transfer held by respondents with different functions. Respondents with purchasing responsibility reported the industry to be the most behind schedule on seven of the eight items. Moreover, there is a substantial difference between the views of purchasing and marketing, the two functions that have the best (or at least most frequent) view beyond a company's walls of the entire industry. Indeed, adjacent functions-in-contact along the chain believe that the transfer of responsibility is at markedly different points. Thus assembler purchasing and system integrator marketing see these developments quite differently. But so do system integrator purchasing and indirect marketing (figure 17).

**Implications**

Survey respondents report that the transfer of task responsibility from the assembler to the supplier is basically on track — about halfway between 1985 and 2005. Combined with their views of the 1995 responsibility allocation discussed previously, the pace of the transfer raises questions as to how much and what kind of change the industry still faces. Unfortunately, the data are somewhat ambiguous and do not provide completely clear answers.

The industry may be halfway to a transfer of responsibility that is simply not as major as many observers expected. This suggests the industry will experience further adjustments but no wrenching transfers except perhaps in marketing. Of

course, marketing may be an area where consensus responsibility will continue to reside with assemblers, as the prior finding suggests, so even here the remaining transfer may be minor.

On the other hand, the transfer of responsibility can occur in numerous ways, and it might be that the industry's transfer is following a two-stage pattern. In 1995, the industry is at the halfway point. But halfway means only the first stage is completed in which suppliers accept higher levels of responsibility but there is no change in assembler responsibility. The second stage, to be completed between now and 2005, might involve shedding responsibility by assemblers, thus completing the full transfer.

This second interpretation suggests that what today looks like a high and shared responsibility system is in fact temporary. During the next decade assemblers will complete the transfer by surrendering responsibility and authority that is now shared. On the other hand, the differences in views of assemblers and suppliers might suggest that a more difficult and protracted structural change process awaits the industry in the years ahead. Not surprisingly, there is some unevenness, since the assemblers may find it easier to transfer responsibility in areas such as electronics where they never exclusively held responsibility, than in other areas such as seats where they did have responsibility.

The functional differences among respondents suggest that communication across functions is still restricted. While they may be learning to work together and expanding their narrow views, they may still be looking at the world outside the company from their own perspectives. Since purchasing and marketing are the main managers of relationships between companies, these differences in perspective raise serious concerns as to how smooth these relationships can be.

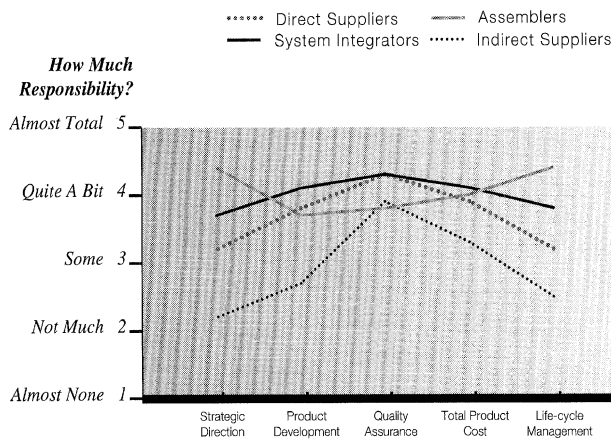
**Responsibility for coordinating activities**

**Findings**

Respondents indicated how they think responsibility for coordinating activities will be allocated among assemblers and supplier roles by 2005. They rated responsibility for coordinating two general types of activities: (1) a set of five value chain activities and (2) compliance in four major regulatory arenas.



FIGURE 18  
ALLOCATION OF COORDINATION RESPONSIBILITY ALONG THE 2005 VALUE CHAIN



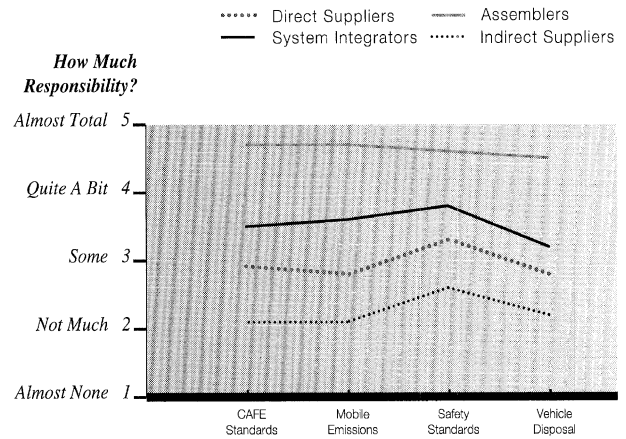
Two of the five value chain activities reveal a traditional responsibility pattern. For both strategic direction and life-cycle management, respondents report the highest level of responsibility with assemblers, the next highest with system integrators, followed by direct suppliers and indirect suppliers.

However, three other value chain activities — product development, quality assurance and total product cost — yield a quite different pattern. Assemblers, system integrators and direct suppliers have high levels of responsibility with system integrators taking the coordination lead on product development and sharing the lead on quality assurance and total product cost. The coordination responsibility of indirect suppliers is high for quality assurance and moderate for product development and total product cost (figure 18).

Company role yielded only one consistent difference in responses about the future (in contrast to the question targeted to today's responsibility allocation). For product development, assemblers describe a more differentiated responsibility system, one in which they again see themselves as having the most responsibility, quite a bit more than suppliers assign them. In fact, both system integrators and direct suppliers assign more product development responsibility to system integrators than to assemblers, while indirect suppliers see them as roughly equivalent.

Respondents also rated the responsibility for coordinating the response to four regulatory demands: CAFE standards, mobile emissions, safety standards and vehicle disposal. They attribute responsibility across company type

FIGURE 19  
ALLOCATION OF COORDINATION RESPONSIBILITY FOR REGULATORY COMPLIANCE



much as they did for the first two value chain activities, but they differentiate even more. Moreover, the respondents make virtually no differentiation across the regulatory arenas. They assign assemblers the most coordination responsibility for all four areas, followed by system integrators, direct suppliers and indirect suppliers.

The responses concerning responsibility for life-cycle management and vehicle disposal are particularly important in view of respondents' beliefs that the regulatory regime in these areas will tighten. They expect to see more restrictive limits on material use and vehicle disposal while the regulatory demand for recycling will escalate (figure 19).

Interviewees identified some major barriers to restructuring and reallocating these activities. First, there is an important set of cost issues since reallocating responsibilities inherently means reallocating the costs and benefits of performing them. Second, there are problems in communicating and discussing these issues that raise numerous barriers between and within companies. Third, there are concerns by both assemblers and suppliers as to suppliers' ability to assume some of these responsibilities.

**Implications**

If the emerging system has high, shared responsibility, a clear allocation of responsibility for coordinating critical activities must exist. In a shared responsibility system, inaction is a risk (perhaps less of a risk in high- rather than low-responsibility systems because the actions of some may

compensate for the inaction of others). Moreover, in a shared responsibility system the task of coordinating activities becomes critical and ultimately can be a source of great influence and control.

These ratings suggest that assemblers are likely to coordinate activities that define the strategic direction of the value chain and the life-cycle management of the product. Moreover, the responsibility levels for these two activities for suppliers appear remarkably like a hierarchical distribution of responsibility and its complement, authority.

The system integrator has the highest responsibility for coordinating product development and shares it for two other value chain activities, quality assurance and total product cost. Perhaps it is in the coordination of activities, rather than in managing direct responsibility for the tasks themselves, that the effective system integrator role will emerge. However, assemblers report they will continue to bear the lion's share of responsibility for product development. That suggests that either the allocation pattern will change or the exact shape of the future remains to be seen.

These allocations of responsibilities suggest that both direct and indirect suppliers will have lower coordination responsibility for total product cost than for quality assurance. This may be a bit of a disconnect insofar as cost and quality are intimately related and both of these types of suppliers bear relatively high responsibility for manufacturing tasks, as discussed earlier.

Regulatory compliance offers another possible disconnect in the industry responsibility system. Assemblers have the highest coordination responsibility across all four regulatory arenas, but less responsibility than system integrators for product development. The disconnect lies in the fact that product development has traditionally been the primary route to assuring regulatory compliance. This may suggest why assemblers expect to have greater responsibility in product development.

The greatest puzzle posed by these results is the failure of the data to furnish a clear and unambiguous answer to the questions raised in this section. Is today's somewhat inconsistent and loose system the pattern of the future, or does this loose system represent a transitional stage on the way to the system of balanced reallocation of responsibility described by the transfer model?

The uncertainty of these results may reflect respondents' uncertainty regarding the future structure of their industry. After all, there are serious and substantial issues here, affecting both the industry and the individual assembler and supplier companies. Final and effective arrangements may require numerous testing and trials.

**RELATIONSHIPS**

If the industry is witnessing the restructuring of its traditional roles around a new allocation of tasks and responsibilities, then new relationships are likely to develop reflecting the changed roles of companies along the production chain. These new relationships will govern the transfer points in the production chain and will reflect the new realities of power, control and dependence that characterize the industry as it moves forward. New codes of conduct or ethical standards will emerge that better fit these new circumstances and will encourage the diffusion of these newer relationships.

**Changing dimensions**

**Findings**

Respondents rated how common or prevalent various aspects of their relationships with vehicle assemblers or suppliers were in 1985, are in 1995 and will be in 2005. The 21 aspects or dimensions included elements of the relationship structure, various operational and business practices, relational attributes and the extent of sharing within the relationship. From 1985 to 2005, respondents expect to see most of these characteristics become more common.

Respondents report that reliability has become more common since 1985 and will become even more common by 2005. On the other hand, trust shows little change since 1985, especially for direct and indirect suppliers, but all hope trust will become more common by 2005. In fact, four assembler and five supplier interviewees identify developing greater levels of trust as a major transition required in relationships between assemblers and suppliers.

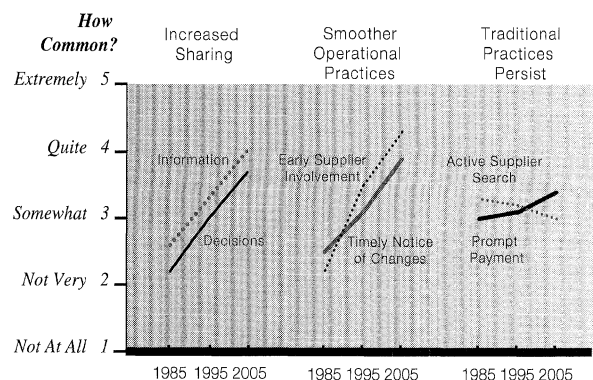
Sharing multiple activities and outcomes between assemblers and suppliers has become more common and is expected to become even more common in the future. For example, sharing information, decisions and responsibilities are all expected to become quite common by 2005. The estimates for 1985, 1995 and 2005 suggest the industry is about on schedule, with about as much change behind it as lies ahead. Again, direct and indirect suppliers are mildly less optimistic than assemblers and system integrators, but the difference is not large.

A number of operational practices underlying the industry's assembler-supplier relationships are becoming more common, suggesting the possibility of improved performance along the value-added chain. For example, early involvement of suppliers in product development, more timely broadcasts of production schedules and more timely notice of volume/engineering changes are becoming more common (although direct and indirect suppliers are more cautious on the last). In fact, early supplier involvement already has increased substantially since 1985 and respondents expect further major gains by 2005.

However, some past business practices characteristic of the older industry relationships persist. There is no evidence that prompt payment has or will become more common, nor that the routine active search for suppliers will lessen. Moreover, if high supplier turnover lessens a bit, it will remain somewhat common (figure 20).

Respondents report that high investments in maintaining relationships by both assemblers and suppliers will become more common, although they believe that such investments were, are and will continue to be more common among suppliers. Somewhat surprisingly, assemblers and suppliers agree that suppliers more often make such investments.

FIGURE 20  
INCONSISTENCIES IN CHANGING PRACTICES



### Implications

These data suggest that there has been and will be a fair degree of change across a wide range of elements in the relationships between and among companies. However, this typically means the specific relational attribute moves from being somewhat “less” common to somewhat “more” common. Thus, while there is change, these characteristics of the new relationships will still be far from universal by 2005. The overall ratings suggest that much of the change is still ahead of the industry. In fact, six of these elements — trust, sharing ethical standards, sharing gains, prompt payment, routine search for new suppliers and high supplier turnover — show virtually no change from 1985 through 1995, while all but routine searches for new suppliers will experience moderate change by 2005.

Industry roles and responsibilities are changing. Such periods of change can result in increased risks and extreme uncertainty. It is not surprising that both parties seek new ethical standards to provide stability in these evolving relationships and value-chain structures. Many assembler and supplier interviewees mentioned their desire for more fair and open relationships.

While the elusive trust relationship between assemblers and suppliers still lies in the future, the industry is approaching the more attainable and perhaps more important “reliable” relationship. Reliability means that the parties can be depended on to perform to the stated agreement. Trust too often suggests a concern for the welfare of another that goes beyond the standard business relationship, more appropriate to social and professional relationships. Trust implies sacrificing one’s own interest; reliability is a balancing of interests.

There is clear evidence of differences among the four types of companies. Direct and indirect suppliers often report less change since 1985 and lower expectations for change between now and 2005 than do assemblers and system integrators. This may mean they are more removed from the intense areas of change, or simply that less change will develop outside the system integrator-assembler relationship.

There seems to be a disconnect across these arenas of changing relationships. Sharing is becoming more common and some practices between the assemblers and suppliers are becoming more effective. Yet other past business practices

persist. The disconnect lies in the assumption that relationships with increased sharing and smoother functioning must be rooted in business practices thus far resistant to change. For example, information sharing and early supplier involvement may depend on developing long-term relationships. But can relationships be long-term if, on average, assemblers regularly search for new suppliers and maintain high supplier turnover rates? Perhaps these views simply reflect a more hard-nosed appraisal that assumes partial relationships are possible in a world in which suppliers must still routinely affirm their competitiveness, and perhaps as often, switch customers.

### Model relationships

#### Findings

Our interviewees commented on two contrasting models for establishing and maintaining bilateral relationships between companies along the automotive production chain: the selection model and the development model. The selection model dictates that the customer routinely scan the market for price, quality and technology opportunities and select a supplier base that provides the best value at a particular time. The development model mandates that the customer commit itself to its suppliers, working with them to develop price, quality and technology opportunities.

Most suppliers and assemblers see the development model as a more efficient and effective basic model for the industry. However, virtually all see its utility as partially restricted. In particular, they believe the selection model works well for commodity parts while the fundamental relationship promised by the development model is important for parts that are proprietary or distinctive. Of course, what a customer company prefers to view as a commodity, a supplier company might view as critical and unique.

The interviews suggest that assemblers have a pretty clear idea of which model their suppliers believe they follow. Their comments suggest that they distribute themselves along the development/selection axis in much the same way their suppliers do.

Suppliers focus primarily on their relationships with their customers and less on their relationships with their own suppliers, where they often still follow a selection model.

However, one assembler commented that the development model will work well only when it also characterizes the relationships between suppliers. Some suppliers recognized this, commenting that the development model is the only way to achieve a stable supply chain.

The dimensions of the development model form part of that elusive but core concept of "partnership." Industry participants refer to a partnership as a closer, more effective, less costly relationship between companies. The interviewees shared their views of what the key elements of such a relationship might be. First, tone is important to promote trust, openness, honesty and fairness. Second, the separate and common objectives of both parties must be clear, understood and respected. Third, there must be a long-term commitment to support and justify an effort that is mutually rewarding.

### **Implications**

The strengths and weaknesses of each supplier model are well known. The development model forges a bond that supports the discrete allocation of responsibility, minimizes duplication, monitoring and replacement search costs. It also elicits behavior characteristics of most long-term relationships — voluntary effort, assistance in crisis and sharing of information. The development model can result in great dependence on suppliers. It requires active sharing among participants that are often competitors and can insulate the supply chain from innovation and new participants. This may effectively risk a downward spiral to noncompetitiveness.

The selection model provides assurance that the current supplier base is world class in selection attributes, constantly encourages the identification and incorporation of new participants and technology, and pressures each participant to improve continuously and assure its own performance levels. However, the selection model can mean the customer must invest resources to select, monitor and back-up the supply base. Suppliers will often restrict effort and cooperation to the minimally necessary level, and these customers may be the last ones offered improvements and innovations.

Each model has its appeal, as illustrated by the generally strong preferences among suppliers for the development model for relationships with their customers and the

selection model for relationships with their own suppliers. In reality, if either of these models is always better, competition would by now have ensured its dominance.

Nevertheless, the development model has captured the imagination of the North American supply base. This is partly because it is associated with the Japanese industry and partly because it provides more opportunity for the restructuring and reallocation of roles and responsibilities across the product chain. These are changes seen as benefiting the industry and companies.

The interviewees provide sound partnership guidelines. But these principles probably were the guides and targets of many failed efforts as well. In relationships, the problems truly are in implementing the details. Moreover, as one supplier commented, "The idea of partnership may be illusory. It is important to recognize the increasing mutual dependence of companies across the product chain." That may be sufficient to create the kind of relationships and alliances that one assembler thinks is best, in which power is rarely, if ever, used and both parties give more than required.

### **Relational barriers**

#### **Findings**

Respondents rated the importance of 23 potential barriers to establishing more enduring and productive relationships between assemblers and suppliers. Some barriers are in current company practices, some in leadership and change strategies and still others in the concerns about the relationship or the other party's performance. The overall ratings range from somewhat important to quite important (covering about one scale point) and reveal little difference in their views.

The primary barriers inhibiting the development of new relationships include three general concerns or uncertainties — trusting others with proprietary information, fairness of the effort/reward distribution and difficulty in assessing the costs of the new relationships. Other important barriers are inadequate company leadership in setting clear goals, and that these relationships can challenge the company's current business success criteria. Respondents rate all of these barriers as "quite" important.

Respondents estimated the degree to which insufficient resources poses a major barrier to change. They rated their

own lack of funds, skill and time as more important barriers than the other company’s lack of these same resources (figure 21). Assemblers and indirect suppliers believe resisting “quick-fixes” and concerns about the fairness of effort/reward distributions pose less of a barrier than do system integrators and direct suppliers. Assemblers view insufficient funds as less of a barrier than do suppliers.

There are differences in respondents’ functional assignment for six of these barriers, and again it is marketing and purchasing that diverge the most. Marketing sees barriers as less important and purchasing sees them as more important.

**Implications**

The rather narrow importance assigned to current resource barriers portrays an industry that is pressured across the board by a lack of time, funds and needed skills. Moreover, these barriers apparently exist across the entire industry since the estimates do not differ by company size, product or industry role. All of the resource barriers are at least

moderately important in impeding the development of new relationships in the industry.

moderately important in impeding the development of new relationships than the other party’s lack of funds, skill and time. This is surprising because it is a human tendency to look outward to explain failure; to see barriers in other parties in a relationship or the external world rather than in ourselves. In a sense, respondents’ self-knowledge suggests a level of openness and balance that is both positive and promising for the industry’s ability to develop more effective relationships.

Three general concerns represent classic issues of uncertainty: Can I trust the other party? Will the relationship be fair? What will the relationship cost? There is an irony here since these questions cannot be accurately answered and anxieties allayed until the relationship develops. These kinds of concerns are no less real and no less important simply because they are inherently difficult to address. Yet these concerns suggest that in the process of change, the biggest barrier to change is the threat of change itself.

**Ethics**

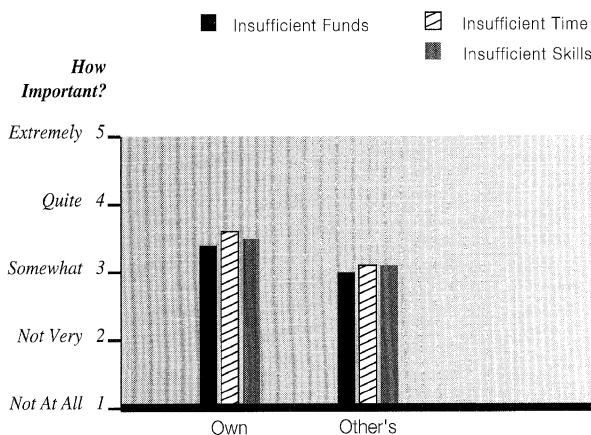
**Findings**

Survey participants rated the urgency of new ethical standards and rules in the industry across a broad spectrum of 15 relationship issues. These include decisions such as allocating costs and benefits; opportunities such as information sharing; and governance concerns such as renegotiations. Respondents rated 10 individual issues “quite” urgent and five “somewhat” urgent. The most urgent area for the development of ethical rules is the sharing of information between suppliers and customers. The next most urgent are two areas in the allocation of relationship outcomes: intellectual property rights and the benefits and rewards of the relationship.

Ethics is an area in which the views of the assemblers and the different suppliers often diverge. System integrators and direct suppliers report more urgency than do indirect suppliers and assemblers on 11 issues, including the three most urgent (two are shown in figure 22). These differences are large and the pattern is remarkably consistent.

The interviews also revealed concerns about the ethical aspects of the new relationships. Both assemblers and sup-

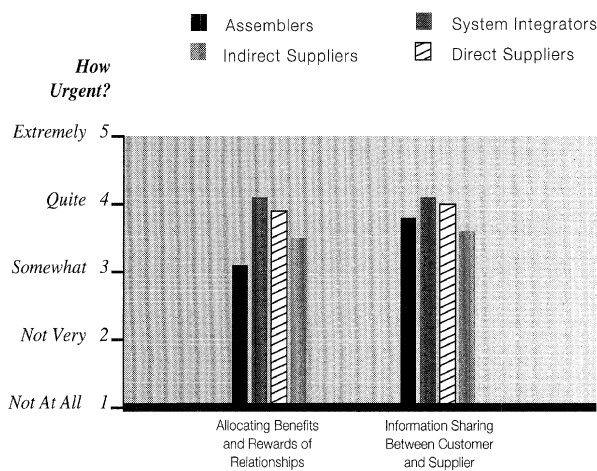
FIGURE 21  
CURRENT RESOURCE BARRIERS TO DEVELOPING RELATIONSHIPS



Resources often become a critical issue when entering or establishing a new relationship or changing an existing one. So it is not surprising that lack of funds, skill and time can be important barriers. What is surprising is that respon-

pliers are concerned about the need to ensure confidentiality for the information shared in the relationship. Neither party wants to see its proprietary information or innovations shared with third parties, whether they are internal supplier

FIGURE 22  
URGENCY OF NEED FOR ETHICAL RULES AND STANDARDS



divisions, competitor independent suppliers or other assemblers. Suppliers also expressed concern about their customers’ belief that gains should be shared but costs remain the problem of the supplier. They also said there should be controls to prevent assemblers from demanding or suppliers from offering to subsidize one customer at the expense of another. One supplier said that some suppliers continue to service customers they have outgrown out of a sense of gratitude for the relationship. In his view, such loyalty should be more common.

**Implications**

The ratings suggest there is some urgency in developing rules and standards across the changing domains of assembler-supplier relationships. The ethical concerns are core areas of relationships and go right to the heart of the industry’s attempts to establish more effective “partner-like” relationships. Until some agreement or shared beliefs about general codes of behavior (ethical rules) are established, it is difficult to imagine that the industry will make much progress in changing these relationships.

It is understandable that assemblers typically see less urgency for establishing these rules than do their suppliers. After all, assemblers are still more powerful in most instances, and thus can establish the rules to meet their needs in a given situation. It is not unusual for the more powerful entity to set rules unilaterally and find them fairer than the less powerful entity whose actions the rules are designed to constrain.

It is interesting and less obvious why indirect suppliers should see less urgency than other suppliers. It is tempting, but probably incorrect, to agree with one supplier who commented, “Of course indirect suppliers have less urgent ethical concerns, they deal with other suppliers who are good guys and not the assemblers!” It is more likely that the complexity and turmoil of the changing responsibilities and relationships with assemblers results in a more urgent sense of need for system integrators and direct suppliers.

A major implication of the changing allocation of responsibilities and roles in the industry is that its traditional power relations are also changing. Suppliers can now choose customers and assemblers may find that system integrators cannot readily be replaced. Mutual dependence suggests a leveling of power differences. Perhaps the industry should move more quickly to establishing and subscribing to acceptable shared codes of conduct. That may be better than an extended period of rancorous conflict as the industry sorts out all of these changes.

**CONCLUSION**

These findings make it clear that the North American automotive industry is indeed in the midst of tumultuous and major change that is being driven by competition and globalization. Many supplier companies must now pursue and defend opportunities and risks on a global scale. The nature of today's markets and competition no longer allows them the luxury of remaining only national or regional players. While the industry is competitive on a global basis, it still must improve its performance and individual companies must address their own specific competitive situations.

Industry roles are changing substantially, both in scope of activities and in the degree of change associated with each. Many of today's direct suppliers face a crucial strategic decision: whether to remain in their current role, pursue a system integrator role or become indirect suppliers. The criteria for selecting suppliers and customers reveal major changes in industry expectations. Suppliers are increasingly being evaluated on more criteria, making the source selection decision more complex than in the past. So too, customer selection is now a more available option for suppliers and they apply increasingly complex and numerous criteria to their choice. The mutual or reciprocal selection of customers and suppliers, which is the basis of relationships, suggests that each seeks some similar and some complementary performance attributes, but that differences persist that might degrade the overall competitiveness of the chain.

As roles change, associated responsibilities are also shifting dramatically. The industry is moving toward a more

tiered structure as technical and other responsibilities move into the supply base. This is especially the case for suppliers that are or plan to become system integrators and take on numerous technical, functional and operational tasks and responsibilities. They face the enormous challenge of negotiating and coordinating all of these activities and changes with assemblers that may have different ideas of divisions of responsibility.

The new allocation of roles and responsibilities means the industry is developing a fundamentally new structure which will require new relationships. Indeed, the changing practices in the industry reveal a decidedly mixed picture, with some moving to newer forms of relationships while others cling to old patterns. The industry today is characterized by two different models of relationships and it is not yet clear which will dominate. It is promising to observe that the barriers to developing these new relationships, while far from trivial, are hardly overwhelming. But the changing opportunity structure and the emerging power and dependence positions in these new relationships will require new codes of ethical behavior from both assemblers and suppliers.

The industry continues to change at varying speeds along different dimensions and at different points in its structure. The major challenge is ensuring that the barriers to these changes, and the disconnects among the changes, do not prevent the industry from reaching the 21st century with a maximally competitive structure along the entire production chain.



## RESEARCH METHODS



The research methodology for this study ensures accurate representation within known statistical limits of the views of the North American automotive industry, as well as the insights of select industry leaders who are particularly well-suited to comment on the industry's changing nature. To this end, the A.T. Kearney and OSAT team adopted a two-fold strategy to elicit industry opinions. In the first part, the team drew on survey responses of a carefully selected cross-section of industry executives to ensure representation. In the second part, the team interviewed a number of carefully targeted industry leaders to develop insight and understanding of the industry's experiences.

### Survey sample

Research on the automotive industry is often hampered by the lack of a complete listing of the companies that make up the industry. While the study team could not remedy this problem, it did draw on eight different existing lists to construct a sampling frame for the survey.

Because the project's frame of reference is North America, these lists included *Automotive News'* Top 100 North American and Top 25 Mexican Suppliers lists and the Automotive Parts Manufacturers Association's (APMA) estimate of the largest 25 suppliers in Canada. The team included all of these suppliers in our target sample. The team also compiled a list of assemblers and suppliers from the guides published by ELM International, Inc.; the SAE Worldwide Manufacturers Directory; OSAT's OSATBase and Japanese North American Supplier Directory. The team relied on lists from ELM, SAE and OSAT's own database to identify more medium- and small-sized suppliers. These suppliers were selected at random for inclusion in our sample list. The team also randomly selected a few companies from the Industrial Technology Institute's Directory of Engineering Service Firms. Finally, the team included all assemblers in North America. After eliminating duplicates and other listing errors, our final sample list includes 318 companies. Given the original sources, this list over represents larger suppliers and under represents smaller suppliers, especially the very small.

The team believes it is important to consider the views of a number of different functions within the firms, since the views on the change issues of interest might differ across the industry's core functions. Top management was included because of its key strategic views, and engineering because so many of the changes involve engineering activities and responsibilities. Also sought were the views of manufacturing because it is the function that produces the goods that actually flow along the industry value-chain. Finally, the views of marketing and purchasing are essential to any study examining relationships along the supply chain. Marketing and purchasing were included because they are the functions that mediate supply chain relationships and implement and execute exchanges across company boundaries. Because smaller companies often combine some of these functions, our 318 companies yielded 1,236 identifiable individuals with appropriate functional responsibility.

Thus the team constructed a nested sample, first selecting the company, then targeting multiple executives to cover (or census) the five functional areas. A detailed survey questionnaire was sent to this representative sample of assemblers and suppliers. Each executive was contacted a number of times to secure as many responses as possible.

### Analytic sample

The team received 258 questionnaire returns, a number sufficient to support a wide range of statistical analyses. The 258 respondents represent 175 different companies for a response rate of 55 percent of companies and 21 percent of individuals. The lower rate of individual responses is partly due to companies that have policies prohibiting more than one respondent to such a survey.

The 175 companies that responded constitute a reasonable sample in our judgment. That is, the sample has high "face validity" in that it contains types of companies that industry participants or analysts expect to find. The sample contains a wide range of companies, and how they differ on some key parameters might well affect their experiences and views.

The sample is dominated by U.S.-based operations (88 percent), with the balance about equally divided between Canadian- and Mexican-based operations. Since only the largest Mexican and Canadian suppliers are included, some are actually subsidiaries or affiliates of U.S. companies, just as a number of the U.S.-based operations have parents in Europe and Japan.

The suppliers within the sample produce a wide range of products, ranging from just over 19 percent in the seats/hard and soft trim category to 6 percent in steering and suspension components. Just under 60 percent of the suppliers manufacture three or more automotive products, while 20 percent manufacture two, and 21 percent produce just one.

Twenty-nine percent report automotive sales of less than \$100 million, 36 percent from \$100 million to \$499 million and 35 percent at or above \$500 million. Similarly, 37 percent report fewer than 1,000 employees, 40 percent from 1,000 to 9,999, and 24 percent at 10,000 or more employees. Not surprisingly, the sample is heavily reliant on the automotive industry for sales, with 58 percent reporting 100 percent of their sales to the assemblers, other suppliers or the aftermarket. Another 22 percent report automotive sales at 80 percent or more of their total sales.

The key analytic factor in this analysis is the role a company plays in the automotive industry supply chain. The team members view the four major roles as (vehicle) assembler, system integrator, direct (first tier) and indirect (second tier) suppliers. The following definitions were provided to respondents: system integrators engineer and provide modules or systems of parts and components to the assemblers; direct suppliers provide materials, parts or components to assemblers; indirect suppliers provide automotive goods to other suppliers. Engineering service and material suppliers identified themselves as direct or indirect. Based on the respondents' self-descriptions, the sample contains 8 percent assemblers, 13 percent system integrators, 63 percent direct suppliers and 15 percent indirect suppliers.

Within these companies, the people who responded also differ across some key dimensions that might influence their views and expectations. The respondents' primary functional responsibilities include strategy (26 percent), engineering (17 percent), manufacturing (14 percent), marketing (30 percent) and purchasing (12 percent).

Respondents also differ in rank, another dimension that can influence their expectations and experiences: 48 percent presidents/vice presidents and 18 percent at the director level. The balance have titles that suggest they are in the upper echelons of middle management.

### Questionnaire framework and development

Because the questionnaire requested some proprietary information, the team developed procedures for assuring complete and continued confidentiality of all information. The team removes all identifying information after the data is formatted for machine storage and analysis. Some OSAT members of the research team have access to identifiable information for data checking, processing and entry. A.T. Kearney team members do not have such access.

The A.T. Kearney and OSAT team spent a significant amount of time analyzing existing literature and secondary data sources in preparation for brainstorming sessions focused on the theme of assembler/supplier relations in the past, present and future. From these sessions the team drafted a questionnaire, which was reviewed by the study's industry advisory board, and revised again before use. The survey questionnaire assesses the following major areas:

**Products and roles.** Respondents identified their companies' primary products and their roles in the industry now and in 2005. They also forecasted desirable assembler and supplier portfolios for 2005.

**Relationships.** Respondents noted how common each of 21 different relationship dimensions between assemblers and suppliers were in 1985, are in 1995 and will be in 2005.

**Customer selection.** Assemblers and suppliers responded to which customer attributes (27 in all) were important in selecting customers in 1985, 1995 and 2005. In this case, assemblers estimated how their direct suppliers select customers.

**Supplier selection.** This section included criteria for customers selecting suppliers for 1985, 1995 and 2005.

**Barriers to change.** Respondents indicated the importance of each of 23 potential barriers in blocking or slowing efforts to establish more enduring and productive relationships.

**Change facilitators.** Respondents noted how often each of nine characteristics or attributes help their companies' efforts to develop better relationships with customers and suppliers.

**Allocation of coordination responsibility.** Respondents indicated how responsibility for coordination of value-chain activities and regulatory compliance would be allocated across automakers, system integrators, direct suppliers and indirect suppliers.

**Allocation of responsibility across assemblers and suppliers.** Respondents indicated how responsibility for eight functional tasks is allocated across assemblers, system integrators, direct suppliers and indirect suppliers.

**Ethical standards.** Respondents shared their thoughts on the urgency of the need for new ethical rules and standards for the changing relationships between assemblers and suppliers.

**Change methods.** To assess performance, respondents identified preferred change methods for 11 performance areas.

**Company learning efforts.** Respondents indicated how their organizations learn about new technologies, practices and processes.

**Risks and opportunities.** Respondents identified three nations outside North America that will offer their company the most attractive automotive opportunity regarding production and market potential for 2005. They also estimated their own sources of future total automotive sales growth and the future globalization of their production operations.

**Competitive performance.** Respondents ranked the three nations whose automotive industries will present the greatest competitive challenges to the North American industry by the year 2005. They also indicated how competitive the overall North American industry is in core activities, such as design or manufacturing. Finally, respondents gave their perspective on their companies' major competitive strengths and weaknesses today and in 2005.

**Changing industry environment.** Respondents estimated North American automotive sales for 2005; changes in proportion of total costs for their organizations for 2005; estimated their organization's automotive sales for 1995 and 2005; and estimated their total number of automotive employees.

**General business factors.** Respondents indicated the rate of change over the next decade for 23 economic, automotive, consumer and regulatory factors.

## Interviewees

The second part of the study's information collection effort reflects the opinions and ideas of thought leaders in the automotive industry, those who might have special insight or understanding of the current industry restructuring. The advisory board, the A.T. Kearney and OSAT team, and other A.T. Kearney and OSAT staff recommended these industry leaders.

The team interviewed executives from six assemblers, including each of the Big Three and three new entrants. The team also interviewed at 20 supplier companies, covering a wide range of size and product specialization, including foreign-affiliated companies. On a number of occasions, interviewees asked that colleagues be permitted to join them. Consequently the interviews actually included more than 26 interviewees. However, each interview was treated as an event, so the analysis includes 26 interviews.

The six assembler interviewees included three vice presidents and three individuals at the director level; three were from the purchasing function. The 20 supplier interviewees included seven presidents, 11 vice presidents and two others; 13 were from the strategic function. The supplier interviews included six indirect suppliers. The differing emphasis on functional roles and the focus on the indirect supplier level provided a balance to the survey returns.

## Interview framework and development

The interviews amplify and elucidate the survey questionnaire findings, as well as provide more in-depth insight to the major issues of the study. The interviews examine the following areas:

**Change issues.** Respondents identified the three major changes that the industry must make to remain competitive in 2005; the internal changes their own companies must accomplish; and the barriers they have encountered. The team also sought to discover how the industry is changing the way it allocates responsibility for activities across the value chain.

**Strategic issues.** Respondents identified the ways customer companies and/or suppliers influence the selection and achievement of strategic goals, and what segments of the industry offer the opportunity for greatest overall industry performance improvement.

**Relationships.** Respondents identified the ways assemblers and suppliers select each other, and the major changes in these relationships that are necessary for competitive success. The respondents also indicated what constitutes an effective partnership, and whether their relationships today are better described as the higher-turnover selection model or the more stable development model.

### **Analytic framework and decisions**

From the beginning of the study, the team committed itself to pursuing as rigorous an analysis of the data as time and capability would support. The team made this decision because too much analysis of this industry is based on weak data — data not treated to even the most rudimentary statistical testing and appraisal. If any of the results should enter the “conventional wisdom” of the industry, the team hopes that it does so because it is more reliable wisdom rather than more conventional.

Most of the data collected in the survey is designed for standard statistical analysis, and the team applied the appropriate tests and decision rules throughout. These statistical tools include a variety of techniques, from straight-forward cross-tabular nonparametric techniques to more sophisticated multivariate techniques and analyses. This report contains findings and relationships that are statistically significant at or below the .05 level; that is, the appropriate statistical test(s) indicates that there is one chance in 20 (or less) that such a result would have been observed merely due to chance sampling fluctuations.

The team’s analytic strategy includes three important facets. First, there is the core interest in how the industry and its constituent companies view its current and future structure. This typically results in asking what the industry’s overall view or report is, and whether that differs depending on the respondent’s company role in the automotive supply chain. Second, there is a pervasive interest in whether these

views may be widely shared across companies with different attributes, or limited to certain kinds of automotive participants. Third, it is important to recognize and understand that respondent views and reports are often themselves related, and that relationship should be reflected in the analysis.

The first leads the team to analyze respondents’ views, reports and concerns as a function of whether they are an assembler, a system integrator, a direct supplier or an indirect supplier.

The second leads the team to examine how an extensive series of respondent and company characteristics may relate to the responses of interest. Thus the team examines all these views to discover whether they are related to the respondent’s title or function and the company’s national site within North America. Among suppliers, the team also checks the relationship to automotive product (measured twice: once by a nine-category scale and again by a reduced five-category scale), number of automotive products, size (measured twice: by sales and by number of employees) and by dependency on the automotive industry (measured by the ratio of automotive sales to total sales).

Unfortunately, statistical technology does not always permit the complete and unambiguous disentangling of complex relationships. For example, a supplier’s role in the value chain is empirically related to its size and its product area. Because of this, it is not always possible to determine whether the views of a group of suppliers — say direct suppliers — reflects that role or position in the supply chain, or is somehow more closely related to the size and product focus that is more typical of direct suppliers. While the distinction often may be unimportant as a practical matter, some readers may find it more relevant to their specific situation.

The third leads the team to undertake analyses more commonly executed in experimental settings, ones that allow the team to more accurately ask questions about the pattern or relationships among the views examined. This is important because it is often the pattern among a set of responses that is more important than the results particular to each member of the set. Thus the team reports the results of a number of multivariate analyses that permit examination of the overall pattern of views and expectations held by respondents, rather than a series of discrete items.

This report has been preceded by a preliminary report and the selection of material for inclusion here differs somewhat. Material contained in the preliminary report that has been deleted from this report (because analysis of the full data no longer supports its conclusion) is indicated in footnotes. There is no special notice if deleted information simply reflects editorial decisions.

**SPONSORS**



**A.T. Kearney, Inc.**

A.T. Kearney offers clients in 30 countries a full range of consulting capabilities focused on achieving improved business performance and enhanced financial and operating results. With more than 2,000 consultants worldwide, it brings top professional insight, industry knowledge and technology expertise to help its clients transform, grow and meet competitive challenges.

A.T. Kearney is the management consulting subsidiary of EDS, a world leader in the development, implementation and management of business solutions. EDS operates in more than 40 countries, with 80,000 employees and annual revenues of more than \$12 billion.

**Office for the Study of Automotive Transportation**

The Office for the Study of Automotive Transportation (OSAT), an office in The University of Michigan Transportation Research Institute, focuses on the future of the international automotive industry. Its overall objectives are to provide industry research and analysis, information resources and communication forums that respond to the continually changing needs of international automotive and automotive-related industries. In addition, OSAT serves as an interface between stakeholders, including manufacturers, suppliers, the university, labor, government, media and the general public.



