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# Exploring the effect of organizational change on the management and delivery of technical service

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# Exploring the Effect of Organizational Change on the Management and Delivery of Technical Service

by

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## Executive Summary

Superior technical service delivery can be a competitive advantage for firms. Any changes that might lead to a shift in performance must be addressed. Sustainable competitive advantage may hinge on how effectively market leaders adjust to rapid innovation and technological change. Along this path, organizations may have to change both in structure and interaction with their customers, in order to differentiate themselves from competition. The choice of technical service organizational structure is complex and dependent on the objectives and degree of diversification of the corporation. Modern decentralized structures represent a rational response of trained professionals to the needs and opportunities created by changing technologies and markets. In 1992, Ciba decentralized their technical service and marketing functions, and formed industry segment teams. This paper addresses how this organizational shift may have affected the technical service capacity of Ciba.

It was proposed that decentralization would enhance quick response to the industry segments by the newly formed teams. The findings of the study indicate that increased responsiveness to customers is influenced more by a lower ratio of accounts to technical service people, rather than from a centralized or decentralized structure. Decentralization may be a mechanism in itself to drive a lower ratio; therefore it could be a secondary influencing characteristic.

Successful learning is a function of the systems, structures and processes

within the organization. As such, organizational systems and individual training and development must be linked together. With decentralization, a fragmentation of the teams ensued and forged communication gaps. Teams tended to meet separately and rarely in concert with each other. Institutional learning and sharing had declined, as did the ability to transfer improved technology into the marketplace.

The use of multiple inputs/ tasks in technical problem solving or project work has been a proven, valuable method. When these efforts are combined in a well-managed endeavor; redundancies and wasted effort can be kept to a minimum. In the case of Ciba, however, the aggregate technical effort seems to have been managed more effectively in the centralized structure, where duplication of technical service projects virtually did not exist.

## Introduction

Ever since the formative years of many industrial giants such as Du Pont, AT&T, General Electric and Standard Oil, including their establishment of research and development departments, much debate has ensued regarding the organizational structure under which R&D should reside. Prior to World War I, Du Pont established the Experimental Station, intending it to become the firm's central research facility. This idea of moving R&D away from operational units catalyzed many debates within Du Pont, and throughout other companies as well. A line was drawn in the sand, as the issue of centralization versus decentralization of organizations and their R&D functions emerged. Corporations were struggling to trace a relationship between organizational structure and business growth. Alfred Chandler found that, although the most effective means of managing a diverse product line was through decentralization, organizations generally did not restructure to this format until there was a change in the top management of the firm [12].

The process of organizational change and restructuring has been no stranger to Ciba Specialty Chemicals. With roots that trace back to 1758, when J R Geigy opened up a small shop in Basle, Switzerland, the company has grown to become one of the largest specialty chemical companies and scientific research organizations in the world. This has been accomplished through acquisitions, mergers, and market growth; obtained by a constant barrage of innovative product entrees into the specialty chemical arena. New product offerings often required development activities or external technical service work to promote diffusion into the market, and

identify areas for additional commercial exploitation. This was important, particularly for the success of the Textile Dyestuffs Division (the U.S. group company of this division is the subject of this research) whose customers had grown to become dependent on the consultative expertise of the division's technical service experts.

The textile complex in the United States has experienced a steady decline in the number of technical workers and managers at all levels, in comparison with what is needed to sustain a strong competitive position globally. As such, many firms rely on the technical service departments of their most trusted suppliers to provide new technology, assist in development and provide training. By consistently delivering these services, the Ciba Textile Dyes name has grown synonymous with innovation and superior technical service delivery throughout the industry.

Throughout most of it's modern history, Ciba maintained a central R&D facility in Switzerland. This was a pooled facility; the various operating divisions provided a budgeted amount of funding for research, generally specified as a percentage of sales. Each division was allocated research facilities within this centralized framework. Technical support personnel, although not part of the research department, were located in Basle as well as in central technical service laboratories established within major countries having operational units. These departments provided a strong support base that was required to successfully commercialize products and processes derived from Basle's R&D center. This centralized organizational structure for R&D coupled with the satellite technical service centers existed for many years, supported the sales and marketing departments, and provided a solid foundation of success for Ciba and their

Textile Dyes Division (here after referred to as Ciba).

## Reorganizing the U S Textile Dyes Division

Organizational change must start by first defining the need for change. By 1992, market demands emerging from worldwide competition, developments in new technology, and management's challenge to develop a deeper level of customer intimacy provided the catalyst for a restructuring of the Ciba Textile Dyes, U.S. group company. The vertically oriented structure shown in Figure 1, with neatly defined and managed departments such as: technical service, sales, marketing, and product management, would now follow in the footsteps of firms such as General Electric, and re-organize into a more horizontal structure, illustrated in Figure 2.

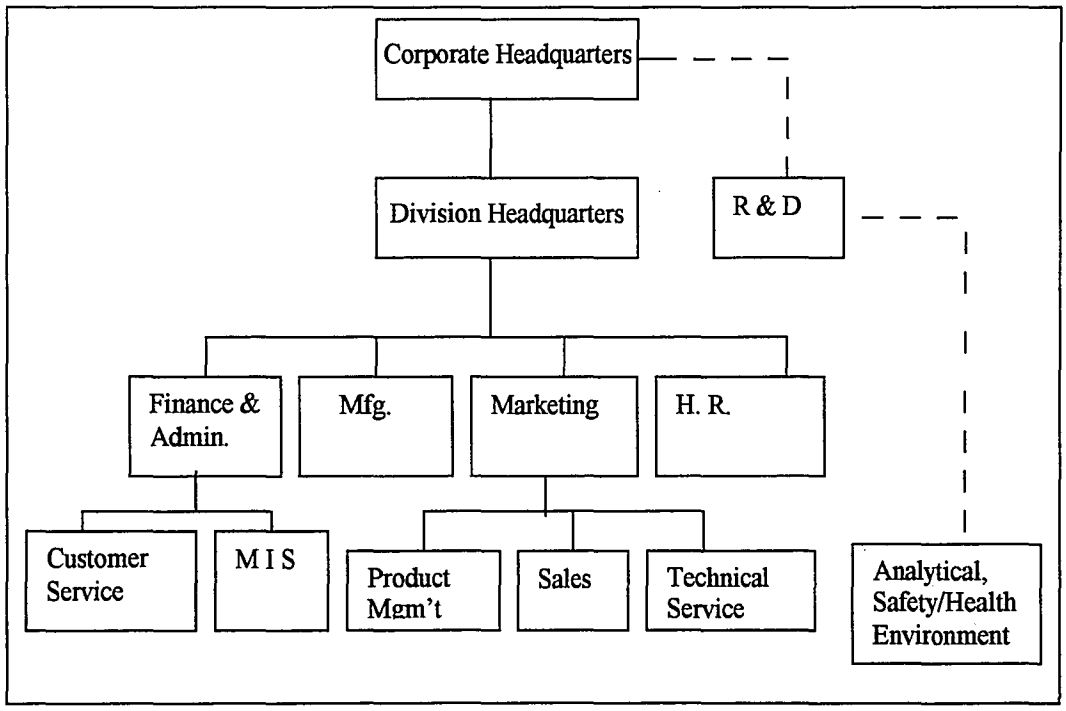


Figure 1. Ciba Textile Dye Division Organizational Structure, 1988

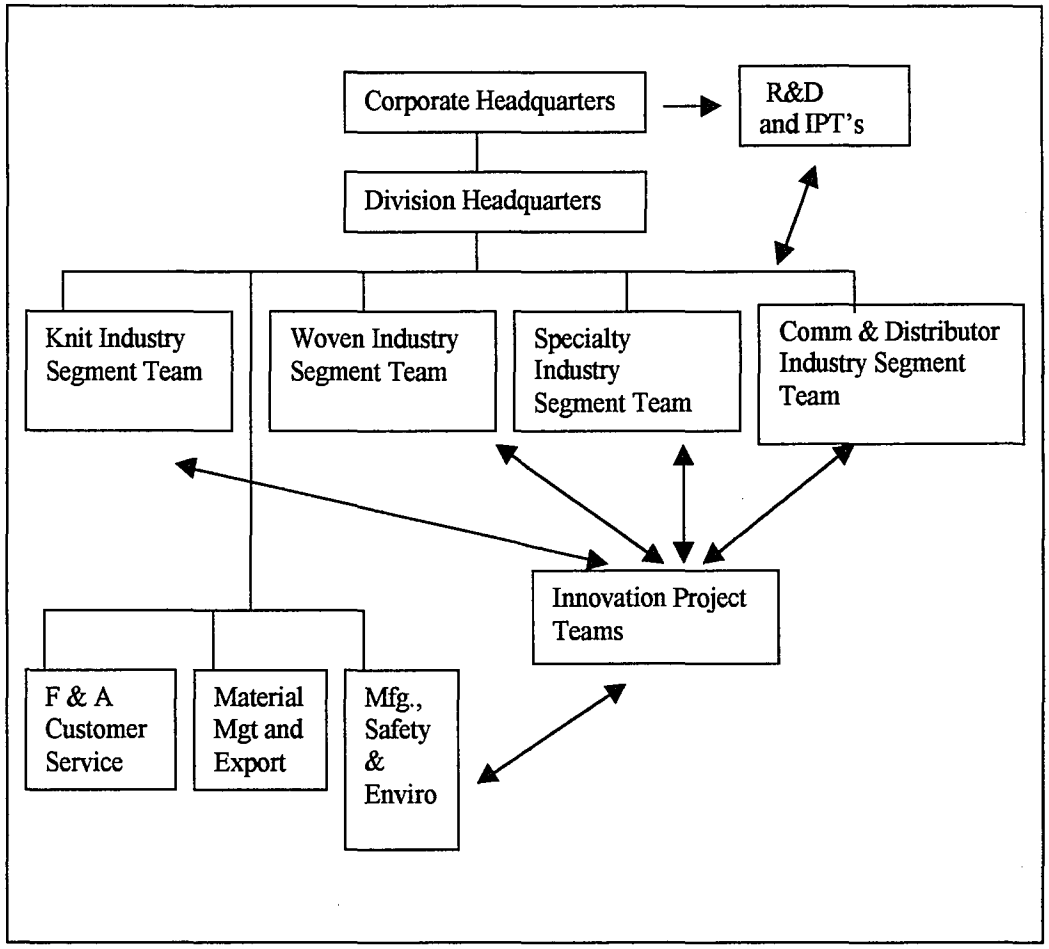


Figure 2. Ciba Textile Dye Organizational Structure, 1997

Industry segment teams would form the basic structure of the organization blending the previously mentioned departments into quasi self- managed work teams, under the guidance of team leaders. The prevailing theory was that companies employing team structures usually see productivity rise dramatically, because, teams composed of people with different skills from different parts of the company can swoop around bureaucratic obstacles and break down barriers that often prevent

getting a job done. Also, since the teams were focusing on one specific industry segment, specialization should enhance knowledge of the customer base, aiding more effective development of innovative solutions to their needs. R & D would continue as a corporate function, however, there would be ties to the market segments, application teams and manufacturing via a network known as innovation project teams (IPTs). The objective of this was to bring the research function closer to the marketplace.

It has been more than five years since the decentralization of the division. Technical service functions now operate within industry segment teams together with sales, marketing and other support personnel. This paper will investigate the strengths, and weaknesses, if any, as well as the operational results since the implementation. The research question that will be addressed in this paper is:

How has decentralization affected the breadth and quality of the technical-service group at Ciba Specialty Chemicals, Textile Dyes Division?

- Is technical service still a competitive advantage?
- Has the breadth and quality of technical service changed?
- Has organizational learning changed?
- Has intra-firm technology transfer improved or declined?
- Is there a more effective organizational structure for the technical group of this division?

## Literature Review

Business literature is saturated with prescriptions for improving the competitive advantage of firms. One issue of particular interest in the management of technology is the phenomenon of *centralization-decentralization*. Many companies continue to struggle with this organizational dilemma either as a response to acquisition, merger or de-merger; or they have engaged themselves to the downsizing or re-engineering craze that seems to be in vogue within corporate America. Additionally, technology oriented firms have had to make decisions regarding the future direction of their research and development departments as well as the structure under which it will reside within new organizational formats. The strategic management of technology can be an important component of competitive advantage according to Collier, who states:

> "Superior technology is the basis of competitive advantage. The competitor who knows how to produce a product [or provide a service], with better performance or in less costly manner than others will usually increase its market share. Competitive advantage based on other factors such as economies of scale is a depleting resource if it is technologically inferior." [7].

Rubenstein has suggested that significant research opportunities exist in exploring this centralization-decentralization issue and more specifically, the

> "... immediate, intermediate, and longer-term impacts of such moves on the product lines, competitive posture and overall performance of the firm." [16;p.336]

*Decentralization* will be defined within the parameters of this study as, a

segmentation of activities with focus towards specific lines of business, product lines or market segments. According to Schein, the more diversified the organization's markets, the greater the propensity for it to split into market based units, allowing for the advantage of focusing functional units around a given technology, customer base, etc. [17; p.264]. *Centralization*, within the confines of this paper, is a system where a variety of work on well defined problems is done, via a controlled, organized assault, employing a critical mass of specialists who are divorced from line operations or business segments [10; p.5].

## Research, Development and Technical Service

The current pace of technological innovation is rapid, and the acquisition of new knowledge is expanding at ever increasing rates. Internal laboratories or technical departments of even the largest international firms can no longer keep pace with developments or have all of the creativity or *innovation power* that will be necessary to guide their businesses into the future [6,19]. This situation, however, provides opportunities for firms who excel at delivering technical service, and as mentioned previously, is particularly important for chemical producers serving the textile dyestuffs market. Non traditional R&D functions, such as technical service, can provide the competitive edge necessary to maintain or enhance market dominance. A strong technical support base also can provide a foundation from which products and processes derived from R&D can reach successful commercialization, as well as add value to those products, which consumers

recognize and are willing to pay for [10;pp. 57,170,250,420], [15]. The critical assumption being made here and throughout the balance of this research paper is that technical service is a sub-function of R&D and as such, any phenomenon explored in the literature relating to R&D will be applicable to technical service.

## Responsiveness of Organizations

Strategic technology management in a diversified company requires flexibility and responsiveness to ever changing market conditions. The ability to respond quickly to problems and challenges that emerge in the marketplace can distinguish one firm from another, and even provide the basis for competitive advantage [7]. The capacity of firms to integrate quick response with commercial success may depend on organizational culture, structure, leadership, and /or other criteria. The more centralized the [R&D] organization, the less responsive their activities will be to operational and market needs [10;p.98]. In order to enhance effectiveness at meeting market needs in a timely fashion, firms may opt to decentralize. As Chandler theorized, pro-active decision making in the field of specialization is enhanced by the decentralized structure [12; p.135]. When organizations decentralize the [technical service] function into product or market units, they gain the advantage of becoming more closely integrated with the customer or product set [17; p.264]. Market segment teams, are one form of structure that specialize in specific product or market units, and promotes working close with customers in troubleshooting, or in developing innovative products or

processes. Specialization leads to expertise and knowledge to apply to the problem at hand; the more focus directed towards a specific concept or issue, the more likely a successful development will occur [3; p.65], [10;p.521]. From this portion of the literature review the following proposition has been generated:

**P1 – Decentralization increases responsiveness to the customer base.**

Responsiveness defined: the time to react to a market [customer] demand and the ability to develop an intimate understanding of the specific market [customer] segment.

## Learning and Transfer of Technology in Organizations

Organizational learning is increasingly becoming popular among firms that are interested in increasing competitive advantage, innovativeness, and effectiveness. A *learning organization* is a firm that purposefully constructs structures and strategies so as to enhance and maximize organizational learning [8]. Meyers' definition of learning; the ability to create, store and retrieve new knowledge, both within and across teams, will be used throughout this research [13]. Learning is stimulated by many external and internal factors, one being the amount of information flow or communication between organizational units [teams]. Poor communication between people or units can be a major block to learning. Taylor and Utterback found that intra and inter [team] technical communication was reduced by changes in organizational structure, technical assignment, and the formation of project groups [18]. More specifically, the

coordination and management of the exchange of technical information is difficult in decentralized structures [10;p.196]. When the need to share competencies across teams exists, a coordinated, centralized approach may be the correct choice [15;p.130].

Brown describes technology transfer as a process of communicating new innovations from developer to user [5]. The transfer of understanding and application of a technology, while greatly facilitated by technical literature, is maximized if it is conveyed primarily through personal face to face communication [10;p.197]. Market focused technical service teams is one method used to establish this type of communication. The formation of industry segment teams offers two potential benefits in terms of transfer of technology. First, there is an immediate and direct access to a greater variety of expertise due to the specialization of the [technical teams], and the deep reservoirs of knowledge within them [3;p.68]. Second, technology transfer is facilitated when the team consists of cross-functional members [2]. Nikkei Electronics has found that centralized R&D is slow to transfer new technology to the developmental stage, suggesting that a decentralized structure may be more efficient in that task [14]. This research will emphasize the delivery or transfer of technology from Ciba to its' customer base, rather than an internal transfer of technology. The importance of communication links resemble those expressed in the discussion of learning organizations, except those links are between the user [market] and the developer [Ciba]. The following two propositions regarding learning and technology transfer are proposed:

**P2 – Decentralization creates *pockets of expertise*, however the overall quality of organizational knowledge and technical learning declines.**

**P3 – Decentralization creates *pockets of expertise* that increases efficiency of technology transfer into the marketplace**

## Communication In Organizations

Organizational scholars continue to debate over whether the efficiencies gained by doing a function once, in centralized structures for example, outweighs the gains realized by specialization, where a more intimate understanding of markets and customers can be developed. While centralized R&D can often make interesting discoveries, they are too often isolated from the market or the end customer, making commercial viability questionable [10;p.517]. The importance of linking R&D to the marketing or business plans of the corporation has been well documented in the literature. Firms that decentralize their technical departments, in an effort to be more commercially focused, must be fully aware of the possibility that efficient corporate resource utilization may be compromised due to the potential of duplication of efforts between the various [teams] divisions [10;p.498], [15].

Ancona and Caldwell summarized, in their research on the performance of product development teams that,

> "Much of the delay in product development comes from the difficulty in coordinating the efforts of the various teams involved in the process." [1].

These results are mirrored by the findings of Liberatore and Titus, who concluded,

> "Decentralized organizations can have a difficult time coordinating R&D plans so that they represent an integrated strategy. For

example, redundancy and conflicts in direction and approach often occur..." [11;p.35].

This is of particular interest when evaluating the effectiveness of a decentralized technical unit, where specialists are dispersed among different industry segments. The underlying management philosophy in this approach is that effective [technical service] requires specialists to be placed into teams where they are best able to perform and develop unique skills [expertise]. The efforts of all the teams than can be integrated back together to recreate the whole [centralized critical mass]. More often than not, the whole turns out to be less than the parts, largely due to lack of inter–team communication [4,9]. The following proposition regarding communication is suggested:

**P4 – Decentralization decreases communication between the *specialists* outside of their own team, *promoting* an increase in duplication of technical effort.**

## Methodology

In the early stages of developing a proposal for the research project, a total of 154 internal technical reports prepared by seventeen technical service personnel at Ciba were examined. It is important to note that these reports represent only a sample of several thousand reports written over this time frame. The reports we reviewed contained information that was deemed important enough for archiving, and therefore were not subject to compliance with Ciba's record retention policy; most documents are destroyed after three years. Seventy- three reports were written during the time period that technical service at Ciba resided in a centralized structure; up to 1992. Eighty-one reports were from 1992 to 1997, which represented the first five years of a decentralized technical service structure. The checklist from a content analysis of those reports can be found in Appendix A. The majority of the reports evaluated were archival records of field technical service work; hereafter referred to as demo reports, performed at customers' production facilities. Items of interest in the demo reports included: response time, site time, distribution of reports, recommendations and amount of total effort as far as personnel involved in either pre-demo or post- demo work.

Potential trends in the management of technology or technical service delivery at Ciba were uncovered. Early indications were that the integration of the technical group into marketing teams, *decentralization*, had an affect on the performance of technical service colleagues working for Ciba. The research

question proposed in the beginning of this paper emanated from the findings in this initial exploration.

## Sample Population

The first critical decision regarding the methodology employed for testing the propositions in this research involved the selection of the eligible population, who could feasibly be contacted to participate in the project. The research was grounded in investigating trends over an approximate ten- year time period. The focus of the study was the technical service group; therefore, it was necessary to identify colleagues who had exposure to events in this arena, specifically between the years 1985 to 1997. Thirty -two potential respondents, who met eligibility requirements, were identified as candidates to participate in the study. Participants included field technical representatives, internal laboratory technicians, product management and technical sales representatives.

## Data Collection

Due to a corporate record retention policy in place at Ciba, which requires the destruction of documents greater than three years old, multiple collection strategies were employed in this study to triangulate the data. Triangulation allows for a mutual confirmation of data and helps to validate the findings. Three data collection strategies were used.

First, an unstandardized interview was held with two senior technicians who

were approaching retirement. With their extensive background and experience, in excess of eighty years combined service, the opportunity was taken to glean insights from them before they left the company. The bulk of their careers were spent during the era of a centralized technical service group. Most of the discussion with these individuals tended to dwell on the good old days. The data obtained via this process was not very substantial, however, these two colleagues wrote many of the original demo reports evaluated at the start of this process. Throughout the conversations regarding several of these reports, they provided insight and gut feelings regarding where the company [Ciba] had been and where it was heading. These discussions are considered to be of some value, particularly in preparing a valid snapshot of the environment at Ciba in the pre-team era.

A second strategy placed two senior technicians into a mini focus group format, to review documentation of four projects that were retrieved from Ciba's technical archives. These projects represented two product- line launches, one pre and one post decentralization. The other two projects were product line performance evaluations, again before and after decentralization. Notes from the general discussion regarding observations from these projects form the basis of the data collected. The rationale behind using this process was to establish whether any trends in the scale or scope of projects at Ciba had occurred. Performance projects tended to form the foundation for institutional learning and training as well as provide data for troubleshooting technical problems in the field or laboratory. Product- line launch projects generally provided all technical and marketing

personnel with data that would be used to promote new products and/or run pilot evaluations with those products at customers' production sites. Any trends in the capability of the technical function at Ciba to develop and deliver new technology, to either the marketplace or internal colleagues, might be detected from this forum.

The final and most involved data collection method involved a survey (Appendix B) that was distributed to the sample population, as previously identified. This survey contained two parts. One part involved questions that were devised to collect quantitative data. Each respondent was asked to numerically identify, for example, the average days to respond to customer requests, average colleagues working on projects, days spent in training each year, etc. It was suggested they refer to any archival documentation or, at least try to recall numerical values to the best of their ability in order to complete the form. If, in any section of the survey, a block was left empty, that response was not included in the total sample population [n] used for calculation of the mean annual value for that particular question. In the analysis of this data, the average annual values for each question were determined and graphed, in order to visually see any significant trends over the twelve-year time span, 1985 to 1997. Additionally, a trend line calculated through Microsoft Excel was super-imposed on each graph in order to help visual assessment of the trend. Due to the fact that the data collected was based, for the most part, the participant's ability to recall facts that were over ten years old, an extensive statistical treatment of the data was not warranted. The results of this exercise will be discussed in the following sections.

The second part of the survey contained open and closed-ended questions designed to stimulate thought and conversation. The objective in this section was to uncover trends that quantitative analysis might not have. Prior to the general distribution, interviews were held with two participants, to pilot the semi-structured survey. No major modifications to the interview and questionnaire were suggested, although it was brought to my attention that it took about 75 minutes to complete, which was rather lengthy. It was decided that the survey should be distributed to all of the participants, in advance of any interviews, at a general business meeting. This would provide time for an explanation of the research project, give colleagues an opportunity to ask questions, and allow them time to prepare the survey and respond to follow-up interviews. A consensual agreement was reached to have the survey data completed within four weeks of the initial distribution.

During the course of conversation it was suggested that the quantitative data obtained may be misleading due to the established records retention policy, and the fact that many colleagues may have to depend on mental notes in order to recall time sensitive data. This point was discussed above and will be considered in the data analysis section.

## Results

Thirty participants were selected to receive the original questionnaire. They included candidates from each of the four industry segment teams as well as support functions, such as product management, that was attached to each team. Additionally, all participants were given the opportunity to review projects or participate in interviews to help clarify any of the data. Several respondents included comments regarding this process, and others indicated that they did not wish to participate beyond the initial survey. An aggregate response rate of 67% was achieved after a six week waiting period. This rate of return seemed appropriate enough to begin analyzing data. Table 1 below summarizes the breakdown of final responses from the surveys:

Survey Response Breakdown by Team

| TABLE 1 | | | | |
|---|---|---|---|---|
| Team Number | Team Name | # potential participants | # actual respondents | Response rate |
| 1 | Knit Segment Team | 7 | 3 | 43 % |
| 2 | Woven Segment Team | 3 | 3 | 100 % |
| 3 | Specialty Segment Team | 8 | 5 | 63 % |
| 4 | Comm/Distributor Team | 12 | 9 | 75 % |
| | Aggregate | 30 | 20 | 67 % |

Although the sample populations of each team are relatively small, the results will be examined for trends within each team as well as for the overall [aggregate] test group.

## Content Analysis of Demonstration Reports

Appendix A provides a brief synopsis of the content analysis of the demo reports that were screened. Some of the more interesting findings from this exercise include, but are not limited to, the nature, formality, distribution, focus and completeness of the reports. Table 2 below shows the distribution of reports screened as far as type of report for each time period. In the pre-team era, most of the reports evaluated tended to relate to, product application processes being reviewed, product end use applications were being investigated or a project related to a specific field service trouble-shooting request that was initiated. The focus of these projects trended more towards gaining information for problem solving and involved multiple product lines and application methods. Reports generated during the team era that we reviewed dealt almost exclusively with results of demonstrations and refinements made [at customers' sites] during pilot studies of new product line launches. Almost all of the work generated during this time had an emphasis on dyestuffs developed for coloration of natural [cotton and wool] fibers. This fits with the focus of R&D over the past decade where emphasis was put into the development of new fiber-reactive and metal-complex dyestuffs, both useful for dyeing cotton and wool.

Since industry segment teams were formed around end-use markets, it was not surprising to find the reports of this era distributed almost exclusively to local primary team members. Prior to these times, technical reports were distributed

to a broad range of personnel, including international locations. Demos were coded for easy reference and retrieval as well. For instance, all plant demonstrations had a specific designated numbering system, as did internal technical projects. Demos were generally greater than three pages in length, and included sections where discussions regarding successes, failures, lab follow-up, audit analysis and manufacturing information could be found. The reporting structure of the centralized organization can be attributed to the existence of a technical manager who demanded formal reporting of results. It was this individuals responsibility to be the gatekeeper of Ciba technology as well as to distribute and develop technical assignments, act as a liaison to professional organizations, keep up with technical developments of the competition and develop training tools for internal and external use. One respondent in an interview stated, "... [technical] sharing was daily through formal report structure and distribution, Nelson Houser style." This style was lost with the conversion to a team based organization and the loss of the technical director function (as well as the individual, himself). The consequences of these changes form the basis of this study and will be discussed in subsequent sections.

Demonstration Reports Screened

| Table 2 | | | | | | |
|---|---|---|---|---|---|---|
| Report Period | # of Reports | # of Project Reports | # of Product Reports | # Trouble-shooting Reports | # Process Checks | Distribution |
| Pre 1992 | 73 | 9 | 11 | 20 | 33 | Wide, Int'l |
| 1992-1997 | 81 | 3 | 53 | 14 | 11 | Local, Team |

Results of Proposition Testing

**Proposition One**

In the investigation of the responsiveness of the technical group, it became apparent that certain trends developed after team formation. Table 3 below shows some of those trends found in the quantitative data of the survey. A graphical interpretation of the data can also be found in Appendix C, Graphs 1 – 5.

Post Team Formation Trends in Responsiveness

| Table 3 | Q1, Q2 | Q5 | Q6 |
|---|---|---|---|
| Team | Days to turn around lab work | Days to resolve technical issues | Days available to follow up on site |
| Knit (1) | ↓ | No Change | ↑ |
| Woven (2) | ↓ | ↓ | ↑ |
| Specialty (3) | ↓ | ↓ | ↓ |
| Comm/Dist. (4) | ↑ | ↑ | ↓ |
| Aggregate | ↓ | No Change | No Change |

↑= Increasing trend ↓= Decreasing trend

The first two questions of the survey, Appendix B, were developed with the intention of establishing a history over time, as far as the quickness of response to customer's requests. An attempt was made to determine a baseline and average time to react to and complete both lab projects and field requests generated by the customer base. With the only exception being the Commission/Distributor team, the other teams reported a reduction in their time to respond either to lab requests or

field technical service requests from their customer base. This trend was observed after team formation. In all cases quicker response is described in terms of days, not weeks or months. There was also a general feeling that colleagues were responding more rapidly since restructuring. In the survey, one member of the Woven team stated,

> "Since 1992 we have increased our technical presence in the marketplace, and this has been recognized as positive by our customers. Expertise in certain processes resides in each team, which gives them the ability to respond quicker and more effectively to customer specific requests. We are now able to do almost the impossible in some cases."

In the textile industry today, quick turn times can be the source of competitive advantage. The ability to deliver laboratory requests or respond to an on-site troubleshooting issue, quicker than the competition, might open the door for significant business gains. In pre-team years, the tendency was that requests for technical assistance from smaller volume customers were pushed out in favor of the larger ones. This obviously slowed down responsiveness to those customers who fell into this category, many of whom today are served by the Commission/Distributor team. The significant emphasis placed on the larger accounts, known as key accounts, catalyzed market share increase, sales began to rise. The adage that *the squeaky wheel gets the grease* could not have been truer than in those days, and big wheels tended to make more noise than smaller ones. Fortunately, there were a significant number of small but substantial firms in the industry that contributed to the one- billion dollar dyestuffs market in North America. The team structure was

put into place to more effectively tap into it.

The team structure at Ciba created a separate laboratory and staff, available to conduct lab work specific to each respective team. The focus, in other words, extended internally as well as externally. No longer did a customer have to get in line, wait and compete with 400 or more potential users of the services, as was the case in the central lab structure.

Technical Service Account Structure

| Table 4 | | | | |
|---|---|---|---|---|
| Period | # Customer Service Labs | # Accounts* | # Technical Personnel* | # Accounts/ Tech. Rep * |
| Up to 1992 | 1 | 400 | 60 | 7 |
| 1992 – 1997 | | | | |
| Knit | 1 | 50 | 15 | 3 |
| Woven | 1 | 30 | 8 | 4 |
| Specialty | 1 | 70 | 12 | 6 |
| Comm/ Dist. | 1 | 125+ | 14 | 9 |

* These are approximate averages. Account rationalization and attrition must be accounted for.

From the information presented in Table 4, one can see an approximation of the structural components of each team and their respective account to technical representative ratio. In most cases the ability to focus on customers within each segment is derived from these low ratios. Once again, the exception to the findings is the Commission/Distributor team who maintain responsibility for a customer base in excess of 125 accounts, and have the highest ratio of all groups at 9:1. This may account for the differences seen in the data coming from this team. Structurally, they have essentially the same number of technical personnel available to service their industry segment as other teams. However, these folks effectively have

twice the amount of responsibility making focus and quick response a real challenge for this group. One member of this team states,

> "Our customer's recognize us as being among the best in the industry, particularly since we have narrowed our focus to be more understanding of their specific needs. The isolation of our business from the home office and the range of geography that I must cover, however, makes it difficult to be everything to all of our customers."

One explanation for this structural anomaly may be due to the fact that team head-counts are determined by sales budgets. Whether by design or fate, the sales budgets for each team is essentially equal. It is obvious then, that the other teams have either larger customers or have gained a larger market share within their industry segment. Whether this is an outcome of focus or not could be a question to pose in another research study. This would require an analysis of sales histories of each account over time, and is outside of the scope and intent of this research.

The Commission/Distributor team has the widest geographical coverage as well, essentially all of North America, and is the team that tends to be the *catch-all* for customers that do not neatly fit into the confines of the other industry segments. For example, the Woven team services the sheeting and toweling industries. The Knit team primarily deals with the large manufacturers of tee shirts and sweatshirts such as Fruit of the Loom, Hanes and Russell Athletic. Both of these teams are almost exclusively dealing with one product line, and that involves dyestuffs for cotton. The Specialty team is comprised of several mini teams that have responsibility for automotive and other transportation fabrics, wool manufacturers, fiber producers, military contractors and nylon outerwear producers. Finally, the

*catch-all*, or Commission/Distributor team, which involves upholstery and other home furnishing fabrics, intimate apparel and formal wear for men and women, yarn, lining fabrics, industrial fabrics, protective fabrics, etc. This team and the Specialty group are involved in the application of more than a dozen product lines to almost any fiber known, that can be colored. Perhaps the diversification of these two teams is one reason why their average time to follow-up in plants has dropped, while the other groups have been able to spend additional time on site.

The Woven and Specialty teams also were able to reduce the time it took them to resolve technical issues at customers facilities. One could speculate that as they became more technically proficient, specialization allowed them to become better problem solvers. The team concept has helped promote more knowledgeable people who could react quicker and help customers more effectively. Several participants indicated in their responses that they could react quicker and are more responsive since team formation, particularly due to the focus of the group on a specific industry segment:

> "Since team formation we are more organized, more customer focused, and this has allowed us to react more quickly and effectively. A smaller customer base, residing in a more defined market segment has provided our edge."

> "We are more focused on the individual segments of our customers. We are more informed and specialized, and this is more of a benefit to our customers."

> "We have made substantial gains in our ability to meet customer's technical needs. Our team focus has been key to this. The availability of colleagues that are focused on specific product lines has helped this effort."

In consideration of how this data ties an independent variable [decentralization] to the responsiveness [dependent variable] of the technical group, the first answer might be to claim that the data supports a causal relationship. Decentralization caused an increase in responsiveness. At a second glance, however, there may be more than one independent variable at work here. A seemingly small number, such as the ratio of accounts per technical representative, may have more of an influence on the quick response than the organizational structure. Although most of the survey participants sensed that they were able to respond quicker, better and more effectively than in the past, it would be a stretch to suggest that this was totally due to decentralization. It would be more prudent to suggest that increased responsiveness to customers is influenced by a lower ratio of accounts to technical service people, regardless of whether the organization exists in a centralized or decentralized structure. Decentralization may be a mechanism in itself to drive a lower ratio; therefore it could be a secondary influencing characteristic.

We therefore suggest that the data obtained at this point in the research **does not support**; P-1- decentralization increases responsiveness to the customer base. Additional interviews and more specific quantitative data would need to be obtained to further investigate the relevancy of this proposition to Ciba.

**Proposition 2**

One of the most valuable innovations adopted by successful firms may be the

recreation of an organizational architecture that stimulates its ability to be a continuously improving entity. In order for that to occur, companies must understand how the learning process can be used to fuel the growth of the total knowledge base of the firm. Workplace learning should empower colleagues to be resourceful, and encourage them to take responsibility for their own learning and sharing of knowledge. Newly acquired knowledge then needs to be transmitted throughout the entire organization, so all may benefit from it. One interesting finding, however, in analyzing the data for the learning hypothesis [P2] in this study was that fewer than one half of the participants, eight of twenty interviewed, used the internet or the Ciba intranet regularly, to either expand or share their knowledge. The network exists to take individual responsibility in catalyzing knowledge expansion, yet so few have been motivated to do so. Additionally, Appendix C, Graphs 6 - 10 indicate that not only are fewer technical reports being written, they are generally only distributed to primary team members. This is a trend that transcends all of the teams, and would suggest that the spread of newly acquired knowledge across the Ciba organization is rather inefficient. This quantitative data is also supported by the responses of many participants with comments such as,

> "We need to document our information more effectively so it does not become lost and so all technical colleagues are aware of activities."
>
> "Technical reports are needed to detail product or performance issues that may be of interest to other segment teams, sales and technical people."

The decentralized team based structure was implemented by Ciba in order

to provide industry focus, and through this intimacy gain more knowledge of the markets that were served. This focus, it was hoped, would stimulate learning and knowledge building by creating networks and firm relationships within the customer base. Although difficult to measure knowledge and focus from a quantitative standpoint, the general feeling of the sample population of this study was that their individual knowledge has grown. If this knowledge is trapped within the boundaries of a team, organizational learning may become stagnant.

> "Meetings are held many times per year, but limited to our team almost exclusively. There is no exchange [technically] with the other groups."
>
> "Our technical group [before teams] would meet every month or more often to share demonstration and project information. Now there is less inter-action between the technical groups of teams. This structure tends to promote vertical sharing; little crossover to other segment teams."
>
> "The limited contact with experts outside of my team has caused a decrease in the rate of my learning."
>
> "In the past we met almost on a daily basis as a technical group to discuss successes and failures and used this a s a means to develop a learning curve. Today, we meet with less frequency, however the group has less breadth of overall knowledge since we are all from the same focused team."

Questions ten, twelve, thirteen and seventeen of the survey were developed with the intention of learning if there were any changes in the amount of time spent sharing technical knowledge either internally [same team] or externally [across teams]. The trends depicted in Graphs 11 – 15, in Appendix C, indicate that for all teams there is no significant change in the amount of time spent in technical sharing with team members, however there is a decrease in the time spent sharing

knowledge with colleagues external to the team. Interview information not only supports these findings, but many participants suggested that formal division wide technology sharing sessions be initiated, at least on a semi-annual basis.

> "The entire technical group doesn't meet as often, so sharing of information has decreased. A technical sharing session with all teams would help to maximize the total information we have within the division."
>
> "There was much more of an exchange of field experiences in [1985 – 1992], however now very little if any field experience is passed on among the teams."
>
> "In the past we learned a great deal from the many technical conferences that were held. All technical, lab and field people could share experiences, we learned a great deal from our failures. Today we still have much interaction with technical and sales colleagues, within our team primarily."
>
> "I think a formalized sharing of technical information would be worthwhile on a consistent basis. This would provide a time to see what efforts were successful and which were not."

Product conferences were a mechanism used for many years to either promote divisional knowledge growth in existing product lines or use as a platform for a new product line launch. Generally, major technical projects were generated to provide the technical input necessary for a successful product conference. Several pieces of data regarding product conferences and product launches were looked at. The first factor was simply examining the results from question eleven of the survey and determining that Ciba has not held the number of product conferences recently as they did in the past. This trend can be found in Graph 16 of Appendix C.

The second area of interest resides in the statements concerning product conferences of the past and opinions regarding future sessions.

> "We need more formal product line conferences where all teams attend. These bring everyone to the same knowledge level. They [conferences] allow interaction on problems, questions, promotions and experiences."
>
> "Product knowledge in [non-primary] areas has declined due to team structure. Because of this we need formal technical education sessions."
>
> "Technical conferences provide the vehicle through which important technical information is shared with colleagues. This could help for more efficient product service in the field."
>
> "Product line technical conferences are needed in order to become more efficient on uses and processes so that the products are performing to the extent that they were developed to do."

Finally, several project reports that were developed prior to and after decentralization were evaluated. The intention of this exercise was to see if any trends could were uncovered that may have had an effect on organizational learning, or the capability of the organization to learn. Table 5 below summarizes the highlights of this data.

Project Analysis Before and After Decentralization

| Table 5 | |
|---|---|
| Product Launch Project (Centralized) | Product Launch Project (Decentralized) |
| | |
| Focused products and application | Diverse products with focused application |
| Technical state of the art | Technical state of the art |
| Long development time | Short time to market |
| Mfg. Difficulties/ no link to launch | Mfg. Smooth/ linked by IPTs* |
| Priced high/ No use of learning curve | Priced to market/ Learning curve used |
| Micro managed by Basle R&D | IPT involvement |
| Non " technical" product champion | Managed by local launch team |
| Product conference employed | No product conference initially |
| Extensive technical "notebook" | Basic technical "notebook" |

* IPT, Innovation Process Team

Although both of the product line launches that were involved in this portion of our study were and still are successes in the marketplace, there are several differences worth mentioning. The product launch in the decentralized structure unfolded more rapidly, with a stronger link to the market than prior launches. A cross team launch group was involved in the initial launch. Members of this launch team acted as liaisons to their primary team and assisted with the initial piloting in the market segments. This helped maintain a constant flow of information across and within the segment teams. This differed somewhat from the product launch initiated during the centralized structure. A team approach was not used. A product *champion* led the charge. One strong comment from both of the reviewers of these reports was that the launch *champion* had very little, if any, technical ability. He

relied on the strength of the entire technical group to help pull the line through. Perhaps the fact that a very extensive technical manual was produced for this product line aided its diffusion into the market.

To summarize the key findings from this section of our data, almost all of the participants agreed on the following points:

- The need exists for a formal technical reporting system to be established that all teams embrace and utilize. Demonstration reports are not required by all teams, and those that use them dot not distribute them externally.
- Technical sharing sessions involving all members of the segment teams need to be scheduled semi annually, on a formal basis. There have been no formal technical sharing sessions involving all of the teams since decentralization.
- Product conferences need to be re-established, and used as a forum to discuss product specific issues and competitive threats. Two product conferences have been held in the past five years.

Successful learning is a function of the systems, structures and processes within the organization. As a result, organizational systems and individual training and development must be linked together. The centralized structure of the past reinforced and enhanced organizational learning through the use of formal reporting systems and processes that promoted knowledge transfer. The intention of this section of the study was to examine changes over time in project scope and scale, or

formal institutional training and education, which might indicate a cause and effect relationship to decentralization. With a very loose, informal technical reporting system currently in effect, coupled with the fact that there have been very few division-wide technology forums since decentralization, **the data supports** P2 – decentralization creates pockets of expertise, however the overall quality of organizational knowledge and technical learning declines.

**Proposition 3**

Transfer of technology involves the migration of technology from one organization, group or individual to another. There are two important components of this process. First, the technology must be created or discovered. Second, it must be expeditiously exchanged and accepted by the receiver. For the purpose of this study, the assumption is made that development of new technology, either process or products, are an output of both R&D and the technical service teams of Ciba. This study is focused on part two from above, specifically, how decentralization may have influenced the exchange of information from the technical group into the marketplace, in terms of size and complexity of the effort, the dependent variables to be measured. From the earlier discussion on responsiveness, it was suggested that, in general, there was a decrease in the time to respond to internal or external technical requests. This trend came, more or less from the ability to focus efforts that was made possible due to a reduction in the ratio of accounts per technical representative. This ratio however, must not be interpreted to mean that, for instance, in the knit

team one technician services three [and only three] accounts. The data gathered from a review of several questions from the quantitative section of the survey show some interesting results. Appendix C, Graphs 17 – 20 illustrate the trends in the size of effort, as far as the average number of personnel involved in responding to customer requests and the average number of customers and Ciba technicians involved in joint project work. Upon examining the aggregate data presented in Graph 21, little change is observed in the overall involvement in projects by either Ciba personnel or customers. A steady decline in the number of technicians responding to a customer request is indicated by the trend line however, this decline has not significantly changed since decentralization. These graphs reflect the total effort of involvement, indicating that a field service representative, several lab technicians and a technical sales representative could group together as a mini response team on customer requests or project work. Similar phenomenon was observed in a review of the Specialty team, although the slope of the trend line for the response of technicians was much steeper than then the aggregate. Almost one half as many people became involved on a request in 1997 compared to 1985. It is interesting to note however, that during the interviews, several participants from this team indicated they are working much more closely with customers.

> "Interaction with our technical people and the technical group of our customers has been a great source to learn about developments in technology."

> "Our customers are more involved with us now in joint process and other technical developments. It is an ongoing process of information exchange."

"I exchange technical information with my customers quite often."

The transfer, understanding and application of technology may be maximized by a more intimate, personal contact rather then by a large group process. In the case of the Specialty team, they feel that they are exchanging more with the customer base but with a smaller concerted effort.

The Woven and Knit team responded similarly with no change in the number of technicians responding to customer requests. The involvement of both technicians and customers in project work did increase, but once again the rate of increase did not seem to change significantly after decentralization. It is interesting to note that these two teams have the lowest ratio of accounts per technician. This indicates more inter-action between these teams and their customer base, which was the intention behind team formation. One respondent appropriately stated,

> "The secret to success is a mutual respect between the technical staff of our customers and ourselves. If these folks develop mutual respect for one another, and they do a good job of communicating to each other how a product may meet specific needs, it makes it easier for us to bring our technical innovations into their plants."

The Commission/Distributor team was the only group to show an increasing trend in the number of technicians responding to requests. Ironically, this team has the highest account to technician ratio. They have fewer people to spare, but if the data is assumed to be correct, they put a great deal of effort into responding. This may expose a potential problem of trying to *be everything to everybody*. In other words no true focus exists.

Referring back to the discussion on organizational learning and sharing of knowledge, it was found that in the centralized structure there was the availability of a large talent pool. A critical mass of varied technical expertise coexisted in one cohesive unit that could be summoned to respond to an infinite number of customer requests. One could summon numerous experts on a variety of product applications to unite in a problem- solving venture. The team structure has dismantled that critical mass, and in the process, created segregated groups of specialists. These experts are adept at transferring new technology into their specific industry segment. When, however, the innovation involves a product or a process outside of their norm, transfer of knowledge either internally or externally becomes difficult.

Looking subjectively at our data and relating it to the proposition on technology transfer [P3], it would be difficult to state that the data fully supports it. There is no question that the individual teams are becoming more customer intimate, by the very fact of their industry specific segmentation. This increased attention may not come from an increased amount of effort, but from a smaller, more concentrated effort of more specialized people. Each team, therefore, may be more effective at delivering innovation into their respective industry segments. An additional problem is the lack of adequate reporting methods that could be used to track technical movements. Reporting systems prior to decentralization were more formal and were useful in determining how broad of an effort was put forth in resolving technical issues. These reports indicate the involvement of production chemists from manufacturing facilities, quality assurance personnel, analytical chemists and

participants from many other functional areas of the firm. The problem with this data is that there is no true measure of the efficiency of technology transfer during the era of the centralized organization. A large talent pool of technical generalists was required to service a large population of customers, there was very little, if any specialization. The technical capabilities of Ciba in that era, however, was well developed and respected throughout the industry. Many new innovations were brought to the market successfully both before and after decentralization.

The data collected from this study **does not fully support** proposition three, P3- Decentralization creates pockets of expertise that influences increased efficiency of technology transfer into the marketplace. Additional data, including an instrument to collect detailed information from the market, would be required to make a more accurate decision regarding the validity of this proposition, as it relates to Ciba.

**Proposition Four**

The use of multiple inputs/ tasks in technical problem solving or project work has been a proven, valuable method. When these efforts are combined in an organized, efficiently managed endeavor, redundancies and wasted effort can be kept to a minimum. Formal and informal lines of communication provide key links among the participants who should all be aware of their individual and group responsibilities in a given project. The key to this statement is, *well managed and communicated,* and can pertain to either centralized or decentralized structures. In the case of Ciba, however, the aggregate technical effort seems to have been

managed more effectively in the centralized mode, as indicated by several statements commenting on the pre-team organization.

> "Nelson was our in-house generator of most projects. He was able to manage the process, which helped avoid overlap and repetition of work. Reports were very formal, with displays and results well documented for the entire technical group to comment on. Now, evaluations and projects are skimmed, and not distributed to all teams."
>
> "Technical reports of the past provided a history of activities at accounts as well as a record of results of product and process evaluations. Many times now, work is duplicated because of the lack of a clearinghouse for technical reports, and the fact is they are no longer being circulated across teams."
>
> "Years ago, all of us knew what projects each of us were involved in. Today we do too much duplicate work among the teams, and many good ideas are not shared or followed up on."

In a centralized system for instance, with some magnitude of control, all of the players on a project team have certain responsibilities along a sequence of activities. Imagine a basketball team, for example, that follows a path of well-defined moves down the court, using a sequence of passes between designated players, until they reach their target and score a field goal. In this case, the team [five players] acts as a whole, knowing precisely what must be done to accomplish the outcome. In a decentralized structure, the outcome may or may not look the same. Once again, *well managed,* becomes the key to operational success. Let's assume the same basketball team is gliding down the court, and each player has their own game plan as to how *they* will score the field goal. If all five players had a different plan on how they were going to get to the basket, the outcome might not be as positive as in the first example. Whether the tasks of technical projects

are organized sequentially, in parallel or coupled; communication of responsibilities across functions is mandated in order to reach the project goal efficiently. Without effective means of communicating, or the desire to share in developments, fragmentation can occur.

> "We need to pull all [technical] people together to discuss new and old products and procedures as well as successes and failures in the marketplace. Many times we find ourselves resolving similar issues as other teams, but we are not aware of it."
>
> "We must be more in contact with each other as a complete technical staff. We need to avoid repeating mistakes or re-inventing the wheel."
>
> "The frequent exchange of information between members of the large technical group under Nelson created a much greater depth of knowledge, more interchange [of ideas], and less repetition of project work."
>
> "Fragmentation of our teams has caused a lot of similar effort across teams."

The laboratory group leader from Team 4 related the following anecdote regarding a project that her group was working on for a particular customer. A customer requested whether or not an improvement could be made to the weather resistance of nylon fabrics to be used in the manufacture of American flags. After a certain number of hours of exposure to the elements, color began to fade and the fabric itself became brittle. The lab worked on this project for almost two months, gaining no real positive results. One day she happened to be talking to a colleague, expressing her frustration on this matter, when she learned that Team 3 happened to be involved in a joint development project between a major synthetic fiber manufacturer and a producer of American flags. They spent several

weeks attempting to improve the weather resistance of the material and, with the assistance of a product from the Ciba Additives Division, were able to produce results acceptable to all of the parties involved. This is an example of the downside effect of being so focused in an area, that it becomes difficult to think out of the box, so appropriately stated by one participant,

> "By being so focused primarily on one [fiber] and with little information being shared across lines, some teams may not be as informed on specific products. We may be performing unneeded lab evaluations because another team may have already run a similar project."

A second respondent commenting on the lack of communication between teams very simply stated, "... focused teams rarely find the time to share experiences." Communication can take place, as previously mentioned, either through formal or informal networks. In the 1980's and early 1990, it was common to hold formal technical sessions within Ciba. These were viewed as a positive means of sharing information. These sessions are now a thing of the past and comments regarding that process were made such as,

> "If we had internal technology sharing sessions like in the past, someone in the division [from another team] may be able to share an idea, application or expertise that could be used by others in the company, who may be attempting to resolve similar problems."
> "We need more technology sharing sessions because we are poor in communicating across teams. Duplicate work is occurring."
>
> "Since team formation, a major impact has been less cross – team sharing of our technical work than in the past."

The instrument used to collect data for the proposition [P4] proposed

regarding the duplication of effort did not contain any quantitative measurements. The conclusion on whether or not the data supports this proposition was based solely on the responses of interviewees whom relied on anecdotal data. This data did expose a communication gap existing between teams in the decentralized structure. One can look in the content analysis of the technical reports, Appendix A, to verify these findings. Consider for example, the limited distribution of demos discussed in prior sections. They provide one indication of a communications gap. The centralized technical group operated via a more formalized and tightly managed way, again as indicated in the content analysis. In this structure, reporting was more widespread, providing a vehicle for disseminating information across functions and divisions as well. The objective of this section was to examine the data for a relationship over time between organizational change [decentralization] and communication patterns [the dependent variable]. **This data is supportive** of P4, which states: decentralization [of the technical group at Ciba] decreased communication between specialists, outside of their primary team, promoting an increase in duplication of technical effort. The following statement made by a senior technician seems to summarize these findings rather appropriately,

> " Our ability to exchange information has changed negatively. I have experienced limited interchange of project information between teams. There is no co-operation between teams on development projects due to limited dialogue. We re-invent all the time. In this regard the team formation did not achieve its goal."

## Conclusions

### Research Question and Proposition Summary

Sustainable competitive advantage may very well hinge on how effectively market leaders adjust to the rapid pace of innovation and technological change. Along this path, organizations may have to change both in structure and in how they interact with their customers, in order to achieve or enhance successful endeavors. The choice of technical service [and R&D] organizational structure is complex and dependent on the objectives and degree of diversification of the corporation. Modern decentralized structures represent a calculated rational response of technically trained professionals to the needs and opportunities created by changing technologies and markets.

The objective of the research conducted in this study was to determine how, if at all, the technical capability of Ciba Textile Dyes Division had changed since adopting a decentralized, team- based structure. The team concept forged market segment teams, combining sales persons, technical experts, engineers, lab technicians and others together, with the intention of increasing focus to specific industry sectors. It was expected that this focus would stimulate and assist in exploiting new opportunities in the marketplace.

The importance of technical service in the textile industry has been discussed in earlier sections of this paper. Superior technical service can be a competitive advantage and for firms such as Ciba, any changes that might lead to a shift in performance must be addressed. In order to sustain competitive edge,

customers must be chosen who value those services. The targeted customers that emerged within each industry segment, were those whom expressed value influencing characteristics in developing a more intimate supplier-consumer relationship, similar to Ciba's.

From the literature search, four propositions were developed which expressed changes a technology oriented firm might expect when re-structuring from a centralized to decentralized organization, or visa-versa. These propositions would be useful in answering the basic research question of how organizational re-structuring affected the technical service group at Ciba. At a first glance over the results of the data, it is quite obvious that decentralization did have some effect on the technical service team of Ciba. A review of these findings may help to summarize how the research question might be answered.

Proposition one proposed that there would be an increased response to the customer base. In terms of the ability of the teams to focus more intimately on the customers within their respective industry segment, restructuring was successful. Almost every respondent indicated that they were able to develop an increased understanding of their customer's business and an expertise in the product lines necessary to fulfill the needs of those customers. Had this been the only criteria used to establish a measure of responsiveness, one could argue that this proposition was supported by these findings. The fact remains however, no bona fide data was exposed that would allow a determination of any change in the quickness and quality of response over the time frame of the study. A different instrument for collecting

data might provide more accurate information in order to evaluate changes fairly. Perhaps a customer survey could be developed to draw input from their perspective. This may help to navigate around any biased input from the internal participant base.

The second proposition is supported by the data. Not only were a wealth of encouraging statements collected from the surveys, some quantitative results were generated as well. The need for formal technology sharing sessions, product conferences and a structured reporting [and distribution] system to promote learning across teams was expressed by every participant. The use of failure as a base of learning was mentioned on numerous occasions. Failures should be accepted because they happened and will happen! Too frequently failures were followed by a hunt for the guilty rather than a search for what could be learned. Intelligent failure is the knowledge gained from those shortcomings and without a system in place to share successes as well as failures, the process of learning throughout the organization may be stifled. Successful learning is a function of the structure and processes within the organization; therefore, systems must be developed in such a manner to create an atmosphere that stimulates knowledge sharing efforts throughout the company, in order to be effective and long lasting.

Proposition three emerged as one that parallels proposition two. Essentially, an examination of how knowledge is passed on externally into the customer base, rather than internally from team to team, is the major difference. Once again the team structure and focus would seemingly accelerate the effectiveness of technology transfer. As summarized in the discussion following the data analysis for this

proposition, the data does not fully support this proposition, due to the inability to adequately measure a change in transfer over time. Although there is a gut feeling that technology transfer has improved, mostly due to focus, there is insufficient data to make that statement.

Communication networks, both active and passive, provide vital information carrying linkages, which can influence the degree of sharing across an organization. If these linkages are broken, or in some cases never developed, the efforts of individuals within the system may never be known. A constructive and regular flow of information can become imperative source of strength. Numerous colleagues expressed concern over the amount of wasted effort "re-inventing the wheel over and over again." There may be instance where these redundancies are useful. They may serve as a checks and balance system or even as a means to learn from. If managed properly, parallel approaches to resolve the same issue may provide a variety of perspectives from which new knowledge may emerge, thus driving innovation or enhancing competitive advantage. The key to success in either avoiding or managing duplication of effort is in communication. With decentralization, a fragmentation of the teams ensued and forged communication gaps. Sometimes this inability to communicate was the result of distances between colleagues or teams. Many other times it was the way the system emerged and developed. Teams tended to meet separately and rarely in concert with each other. Most knowledge sharing was intra-team. The vehicles that were in place in past years to diffuse technical activity information across the organization were no longer in use. Proposition four

suggested that decreased communication networks can influence duplication of effort in organizations, and the data supports this.

Few competitive advantages are long lasting. The essence of sustaining, enhancing or developing competitive advantages lies in the strategies developed to do so, faster than competitors mimic them. The ability of an organization to improve existing skills and learn new ones can be a defensible competitive advantage. One of the questions posed for researching was whether or not technical service was still a competitive advantage for Ciba. Although no proposition was drawn from the literature regarding the effects of decentralization on competitive advantage, one can draw some inferences from the data. If organizational learning, knowledge acquisition and the capability to effectively transfer technology into the marketplace are all in decline, then the competitive advantages enjoyed by Ciba in this arena may be in jeopardy. There is not enough hard data to suggest that Ciba no longer enjoys a competitive edge in delivery of technical service, but leadership in this area may be threatened. Once again, a customer perception survey may be required to set up a baseline from which to begin measuring performance in this area.

## Interesting Findings

One subject that needs to be discussed briefly is the introduction of bias in this study. The researcher was, and still is, an active employee of Ciba, and although no inputs of data to the survey were made, his background would have qualified him

to do so. Preconceived opinion that *something* has changed with the technical capability of Ciba exists within the organization. The objective of this study was to determine, if possible, what if anything has changed and provide insight as to how the train might be put back on track if necessary. Also, many colleagues at Ciba have expressed displeasure with the team structure. Obviously those whom participated were aware that this study was looking at the pre-team [centralized] and team-based [decentralized] structure. There may be those who answered questions in such a manner that they were attempting to influence the outcome in one way or another. This may have emerged more in the quantitative data section, because of the reliance on memory more than on hard reported information. In reaching conclusions regarding the propositions, the writer remained subjective, and interpreted the data accordingly.

There are several interesting findings that developed from this research that may prove to be candidates for further study. First, in the centralized system a single individual emerged as the *go to* person as far as a source of technical information was concerned. One might suggest that this individual was a champion, gatekeeper and liaison all in one. Although not officially designated as such, this individual became the *de facto* technical director of the division, and was at the heart of all technical activities. Once decentralization occurred, this function evaporated. The teams took on the responsibility of technical gatekeepers however, the only gates they seemed to keep were their own. Individuals within each team sought out each other for information, and almost never left their immediate peer group for

assistance. This may be an area to explore as far as how organizational behavior changes with restructuring.

The second interesting discovery was the lack of use of electronic information technology to stimulate institutional learning and sharing. The corporation maintains an internet site, an internal electronic mail system, internal web site and numerous other data collection and dissemination technologies on a local area network. A low percentage of participants who utilized this network were found, however, almost all of them indicated the need to do better in communicating and sharing. This is rather puzzling and contradictory. An investigation into this phenomenon may be interesting, particularly if it includes all divisional colleagues, in order to determine if some other patterns emerge. One would think that from the challenges organizations are faced with today, there is a growing understanding that market success and long term survival may hinge on the effective use of information technology utilization.

A final subject, and one that has been touched on several times, would be to include the customer base in surveys and interviews, particularly when the subject matter relates to responsiveness and technology transfer. In the case of this study, the methodology employed was more or less correct, but the sample population and data collecting instruments could have been more effectively developed. The intention was to measure the influence of an independent variable [decentralization] on the subject organization. By developing a study that looked back over a twelve-year time frame, it was expected to develop data that would help to determine what,

if any changes occurred during this period. This is where the development of proper instruments to collect data becomes important because it can influence the outcome of the study, either positively or negatively.

## Implications for Ciba

This research indicates several areas of organizational concern for Ciba. One subject involves the issue of corporate memory loss. Inadequate information exchange does not promote for organizational learning. As time passes, the flames of expertise that exists within each team may burn out before the knowledge is adequately transferred among all technical associates. Should this trend be allowed to continue any competitive advantages in technology utilization or technical service may be in jeopardy. Management needs to investigate this seriously, and stress the use of existing information systems as a short -term fix for this issue.

A second consideration may be the formation of a hybrid organizational structure, creating a divisional technical manager or technology management team to overlay the team structure. Many colleagues expressed the need to have a centralized location where technical information could be generated and found, other than literature references from Basle or segment team peers. The production of development projects, training and educational forums and product conference preparation, could also have their genesis within this domain. From the standpoint of technology diffusion, this function warrants exploration as well. A technology

gatekeeper or visionary seeking cutting edge developments can keep a technology driven organization on track. The aforementioned reasons offer rationale why this function should be included into the organizational structure. A progressive company should, on occasion, look back at what worked in the past and alter or adapt it to fit the present as a means of reaching the future.

Some other points to consider as far as the team structure is concerned are as follows:

- Establish focus groups and special projects so colleagues from diverse backgrounds and responsibilities can expand knowledge, particularly in key technology areas.
- Maintain a good supply of technology generalists in house as a source for continuous replenishment and training.
- Increase the quality of information shared both internally and externally.
- Leverage existing company resources to produce new market opportunities. This can't be done effectively when teams work in isolation.

Teams can be a powerful tool. If utilized to their fullest potential, they offer an opportunity for increased performance, that otherwise would not be possible.

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## Appendix A

Content Checklist of Demonstration Reports Screened

Appendix A.

**Content Checklist- Demonstration Reports Screened**

| Subject | 1985 - 1992 | 1992 – 1997 |
|---|---|---|
| Focus | Multiple applications | Natural fibers |
| External colleagues involved | ✓ | ✓✓ |
| Internal (lab) colleague involvement | ✓ | ✓✓ |
| Success description | ✓ | ✓ |
| Failure discussion | ✓ | - |
| Involvement with/ suggestions for Mfg. | ✓ | ✓ |
| Lab pull through | ✓ | ✓✓ |
| Customer partnership | ✓ | ✓✓ |
| Description of action items/ next steps | ✓ | - |
| Completeness<br>- formulations present<br>- process fully described<br>- adjustments from standard desc. | <br>✓<br>✓<br>✓ | <br>✓<br>-<br>- |
| Cost evaluation | - | ✓ |
| Product launch related | - | ✓ |
| Formality of report | ✓ | - |
| Type of service (project, troubleshoot) | ✓ | ✓ |
| Length of service ( presence at facility ) | ✓ | ✓ |
| Initiator of request<br>- customer<br>- internal | <br>✓<br>✓ | <br>✓<br>✓ |
| Distribution | Extensive External | Limited Team |
| Audits of customer sites | - | ✓ |
| Internal Tracking System for report(s) | ✓ | - |

✓ Denotes presence or applies to reports.

✓✓ Denotes increase in activity observed in reports.

- Denotes no presence in reports.

## Appendix B

Sample of Survey Questionnaire

Appendix B

| To: Distribution | Date: November 6, 1997 |
|---|---|
| c.c. | From: Dave Fenstermaker |
| Subject : Management of Technology Field Research Project | |

# Please, I Need Your Help !

Would you please donate some of your time to assist me in developing the data necessary in order to fulfill the last requirement (a field research project) of my Master's degree in Management of Technology?

All of the information from your responses will be kept confidential and shared with others only in summarized form. Given that this survey is internal to Ciba Specialty Chemicals, Textile Dyes Division, the sample size is limited, so every response will be important for the ultimate quality of the findings.

The survey is a perception survey; there is no right or wrong answer. It attempts to establish the general belief of a group of people through a " nominal group" process. First, you are asked to complete this survey privately. The responses are then compared. If there is a general agreement among the respondents, the process ends. If there is significant disagreement among the respondents, then a small focus group will be convened to briefly discuss major differences in an attempt to achieve consensus. As a final means of triangulating data I will interview a random sampling from the respondent population. What I am looking for is trends in our management of technology that may have been established or altered over time and/or with organizational changes.

I have enclosed a preaddressed envelope for your convenience, or if you like, you can leave the completed questionnaire with Lou Turnbull in High Point , T-161, and she will put it in my mail. I would like to have them completed and returned by December 1, 1997 if possible, so I can begin the data evaluation process.

Thank you, I appreciate your help!

Dave

For the period 1985 – 1997 please answer the following questions to the best of your ability. You may refer to any documentation or historical data, etc. that would provide the most accurate data. Place the codes below in the boxes under each year as indicated.

A = 0 – 1day  C = 2 – 5 days  E = 10 + days
B = 1 – 2 days  D = 5 – 10 days

1. What was the average door to door turn time for customer generated lab requests?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

2. Indicate the average time to respond to a customer inquiry.

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

3. How many times each year have you made a formal contact with a colleague from outside the division regarding a technical issue?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

4. How often has a colleague from outside the division contacted you regarding a technical issue?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

5. How much time on the average did it take to resolve a customer specific technical issue?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

6. What is/was the average amount of time spent at a customer's site to resolve a single, specific technical issue?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

7. How much time is spent each month on competitive product or process evaluations?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

8. How much time is spent each month on internally generated technical requests?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

9. On a monthly basis, how many days are spent generating technical reports for distribution?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

10. How many days did you attend formal technical meetings each year?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

11. How many days of formal product conferences are attended each year ( ie: Cibacron or Terasil conferences ) ?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

12. How often each month do you meet with technical colleagues to formally share technical information?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

13. How often each month do you meet with technical colleagues outside of your primary team to formally share technical information?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

14. How much time do you spend on major projects each year?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

15. How much time is spent each year on technical work for new product launches?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

16. How much time each month is spent on procedure developments?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

17. How much technical training do you attend each year?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

18. How much time each year is devoted to customer plant audits?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

19. How many days are spent following up on plant demonstrations or troubleshooting visits?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

20. How many days are spent each year celebrating successes ?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

21. How many days are spent <u>each year</u> sharing technical information with colleagues outside of the technical group?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

For each of the following, please fill in each box with a number that best answers the question.

22. How many colleagues would normally be involved in resolving customer related technical issues?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

23. How many new product launches have you been involved with ( ie: Cibacron C, LS, etc )?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

24. How many technical projects have you been involved in each year?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

25. How many external technical training conferences have you attended each year?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

26. How many company-developed technical training conferences have you attended each year?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

27. How many new product development projects have you been involved with ?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

28. How many new process development projects have you been involved with?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

29. How many equipment or machinery development projects have you been involved with?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

30. On the average, how many colleagues work in project teams with you?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

31. How often were/ are results of projects published?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

32. How many papers have you published?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

33. How many formal plant audits have you conducted?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

34. How many presentations have you given at trade meetings or professional association conferences?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

35. How many, if any, projects were worked on jointly with customers?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

36. How much time do you spend preparing for plant demonstrations?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

37. How much time is spent preparing a report for distribution, for each demonstration?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

38. How many people are your reports distributed to?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

39. How many projects have you been involved with that included outside resources such as machine manufacturers, associations such as Cotton Inc., etc. ?

| 1985 | 1987 | 1989 | 1991 | 1993 | 1995 | 1997 |
|---|---|---|---|---|---|---|
| | | | | | | |

Please answer as many of the following questions that are applicable with a brief explanation.

40. Has your expertise or knowledge expanded at a faster or slower pace since 1992? Please explain.

41. From what source do you obtain information on new technology or new technical developments?

42. How often do you share information and knowledge with customers?

43. What was the frequency of sharing and or discussing technical issues with colleagues in the years 1985 – 1992? Did you meet often and learn from failures as well as successes?

44. How about question 43 for the time period 1992 – 1997 ? Has learning and sharing changed in any way, either positively or negatively?

45. Do you use trade journals, technical conferences and / or company training sessions to build upon knowledge and skills?

46. Do you use the Internet or any other similar technologies to either expand or share knowledge. If so, how often and with whom?

47. Which groups received your technical reports in the period 1985 – 1992? (Check all that apply)

Technical _____ Sales _____ Product Management _____ Basle _____

Customer Service _____ Human Resources _____ Lab Technicians _____
Other _____

48. Which groups received your technical reports in the period 1992 – 1997? (Check all that apply)

Technical _____ Sales _____ Product Management _____ Basle _____

Customer Service _____ Human Resources _____ Lab Technicians _____
Other _____

49. Where did you go to search for technical information between 1985 - 1992? List a name or job title if appropriate.

50. Where do you seek out technical information now? Or since 1992 ?

51. Would a technology sharing session within our division be a worthwhile endeavor? If yes, why? If no, why not?

52. Have you noticed a change in the amount of new technology or knowledge that has occurred within our organization over the years 1985 – 1997? Please explain briefly.

53. How often did or do the more senior technical colleagues share their experiences with others in 1985 – 1992?

54. Same as # 53 but for the years 1992 – 1997?

55. Do you feel that Ciba has kept pace with the competition in our ability to deliver superior technology and technical service? Please explain briefly.

56. Have you noticed a change in the effectiveness of our technical service since team formation? How?

57. Has your own ability to react to customer's needs changed since team formation? Better or worse. Please explain.

58. How often do non-technical colleagues become involved in problem solving? Has this changed over the years 1985 – 1997?

59. Has your technical peer group expanded or contracted since 1985 – 1997 ?

60. Has your ability to pull through or follow up on technical issues changed since 1985 ?

61. Has your ability to be creative or innovative changed since 1992 team formation as compared to pre team?

62. Do you feel that formal technical reports are needed? Why or why not, and who needs to receive them?

63. Please give both positive and negative comments about the Cibacron C launch versus the Cibacron LS launch.

64. Refer to # 63, how does the Terasil W and Solophenyl 2000 compare?

65. If you can think of any other product launches that you have experienced, please comment here about them.

66. Has the reduction of analytical services effected your problem solving capabilities?

67. Do we need more formal product line technical conferences? If so, why. What are the benefits to them?

68. Would you benefit from monthly. Quarterly, or semi-annual technical sharing sessions? Who would you include?

69. How often and through what mechanism is field experience passed on to your colleagues?

70. Has this changed from 1985 – 1992 period. How has it changed?

71. Do you or your teams spend enough time evaluating results of projects? Has this changed from the 1985 – 1992 period?

72. In your opinion, have our customers recognized a change since 1992, either positively or negatively, in our technical capabilities?

73. Do you spend more or less time face to face with customers since 1992? How much more or less percent wise?

74. Has your relationship between sales, marketing and laboratory colleagues changed since 1992? Please explain?

75. How often did you interact with production / manufacturing locations of Ciba in 1985 – 1992 ?

76. See # 75, for period 1992 – 1997?

77. Do you feel you have enough total product line knowledge or must you learn on the job? How that we improve in this area? Has this changed since 1985?

78. How often do you correspond with Textile Dye colleagues in from other countries? Has this changed since 1985? Since 1992?

79. How often do you correspond with colleagues from other divisions regardless of country? Has this changed since 1985? Since 1992?

The following questions are optional:

Would you be interested in being interviewed to help clarify some of these questions? Yes No

Would you be interested in reviewing 4 – 5 projects from the past and present, for changes in quality, effectiveness, etc.? Yes No

If yes to either above please give your name and phone extension.

---

Which best describes your primary job function.

Sales/ Marketing _____ Internal Lab _____
External Technical _____

Management _____

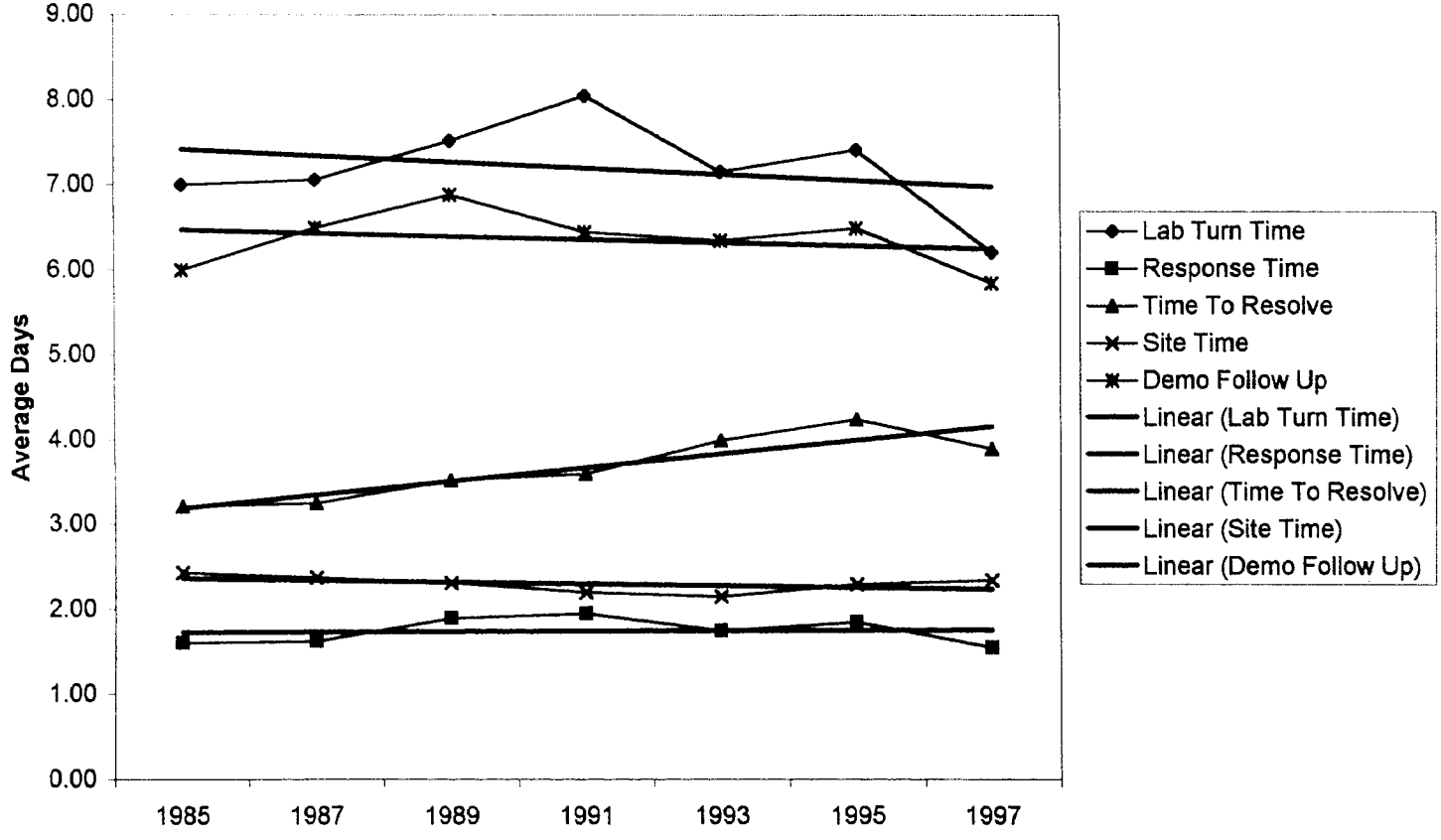
Would you be interested in receiving a copy of the final report or a synopsis of it ?
Yes No

********** Thank You Very Much For Your Assistance **********

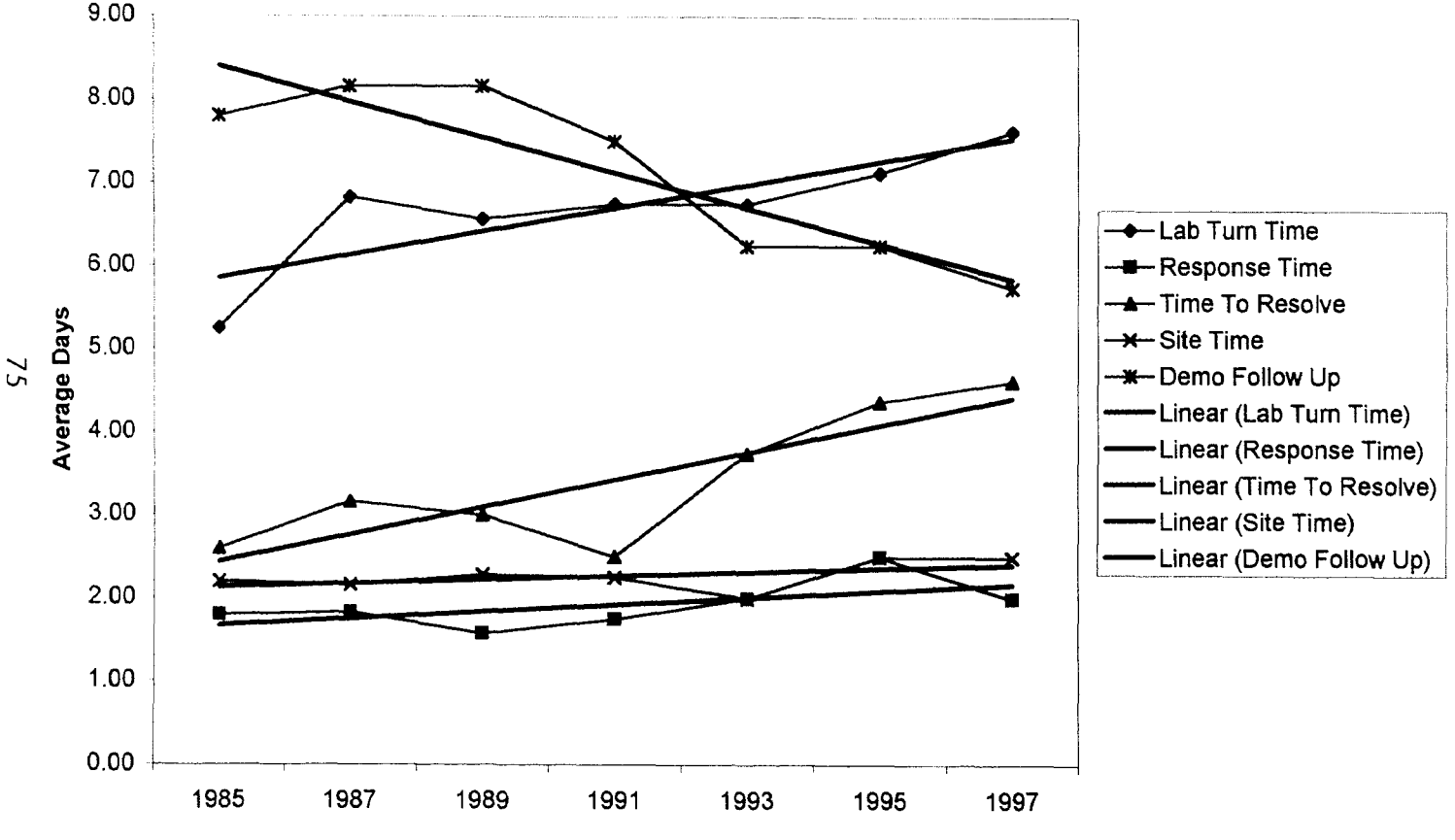
## Appendix C

Graphs of Quantitative Data

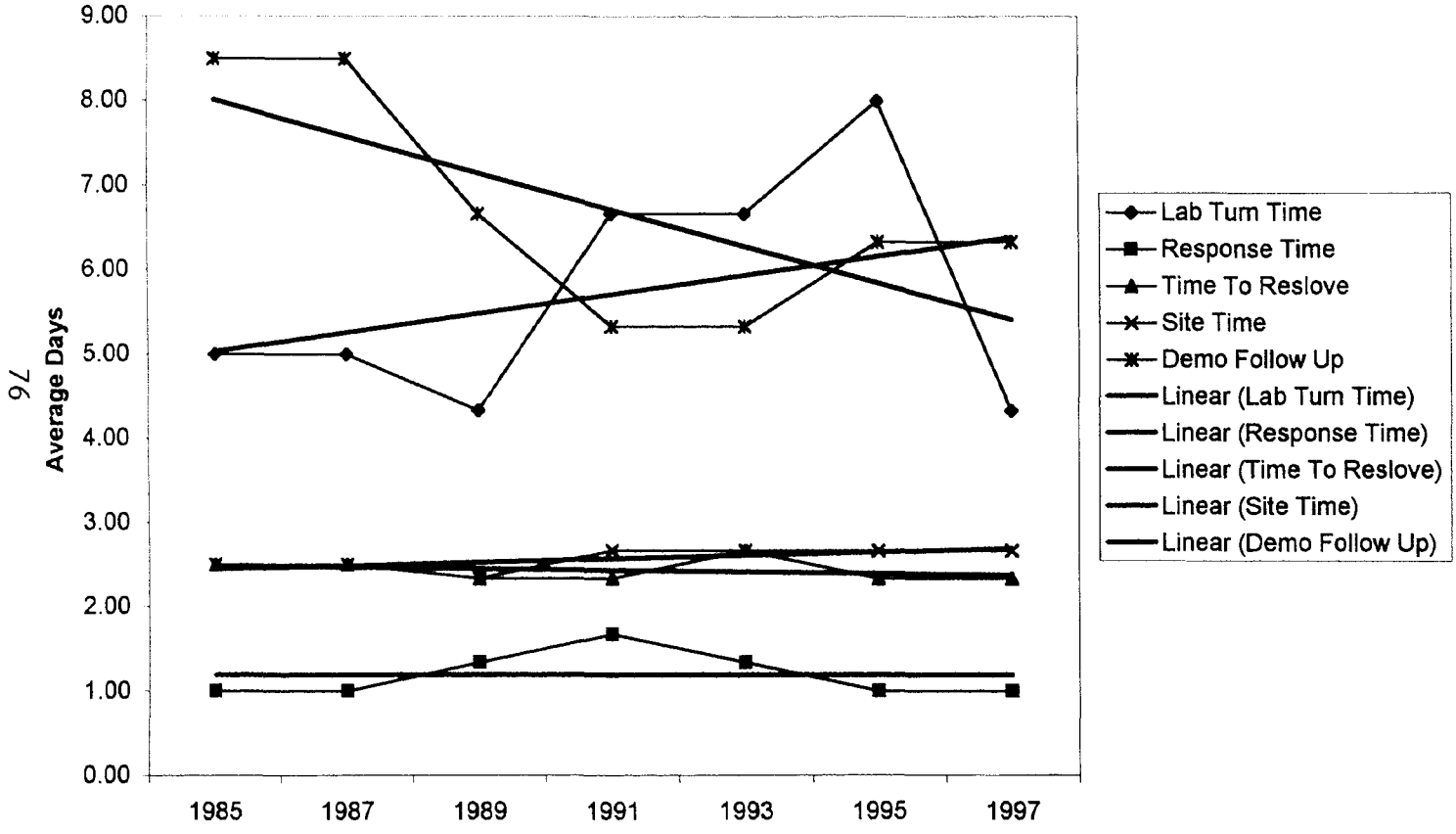
**Graph 1 Aggregate Customer Inquiry Response**



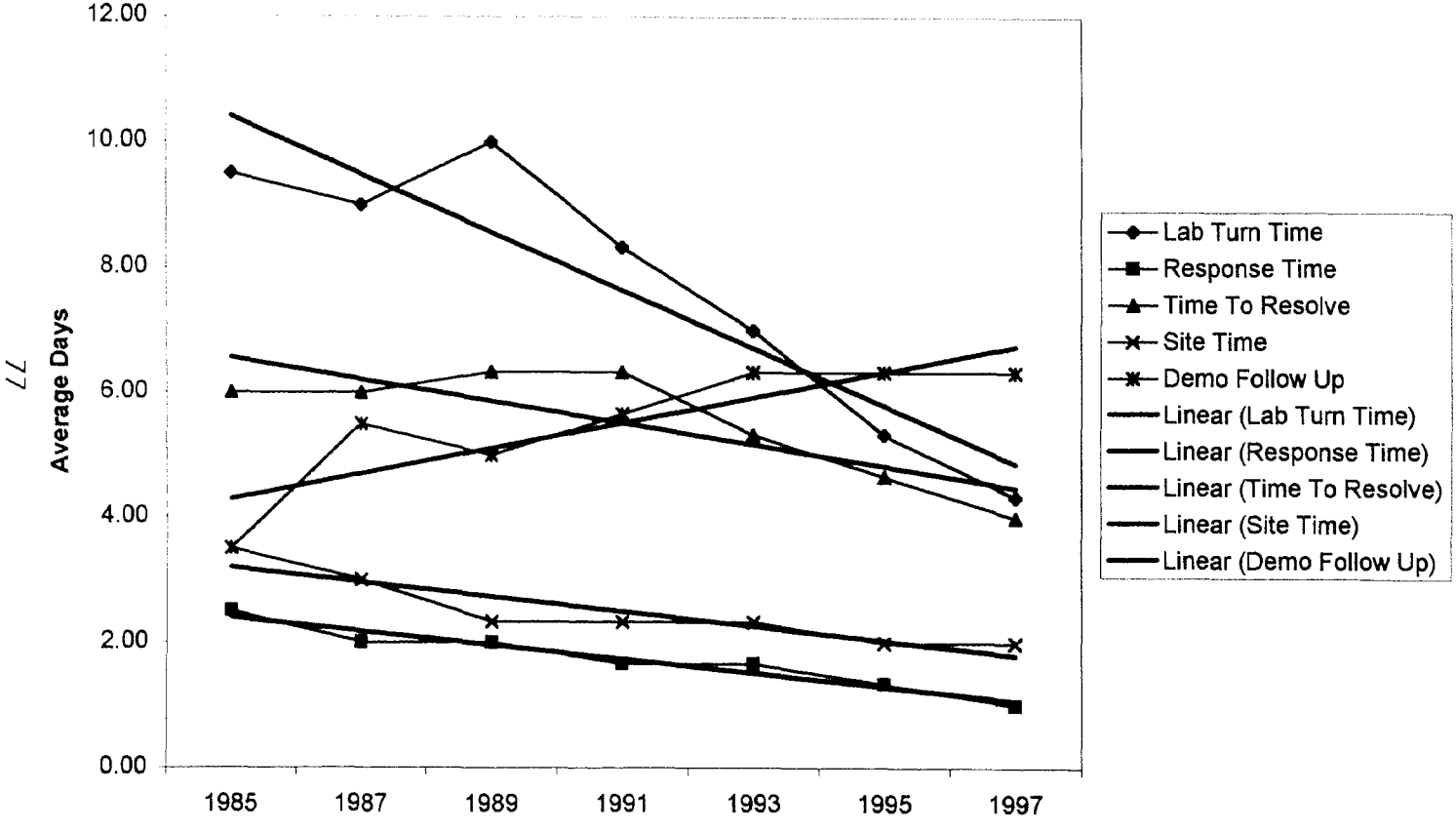
**Graph 2 Commission Distributor Team Customer Inquiry Response**



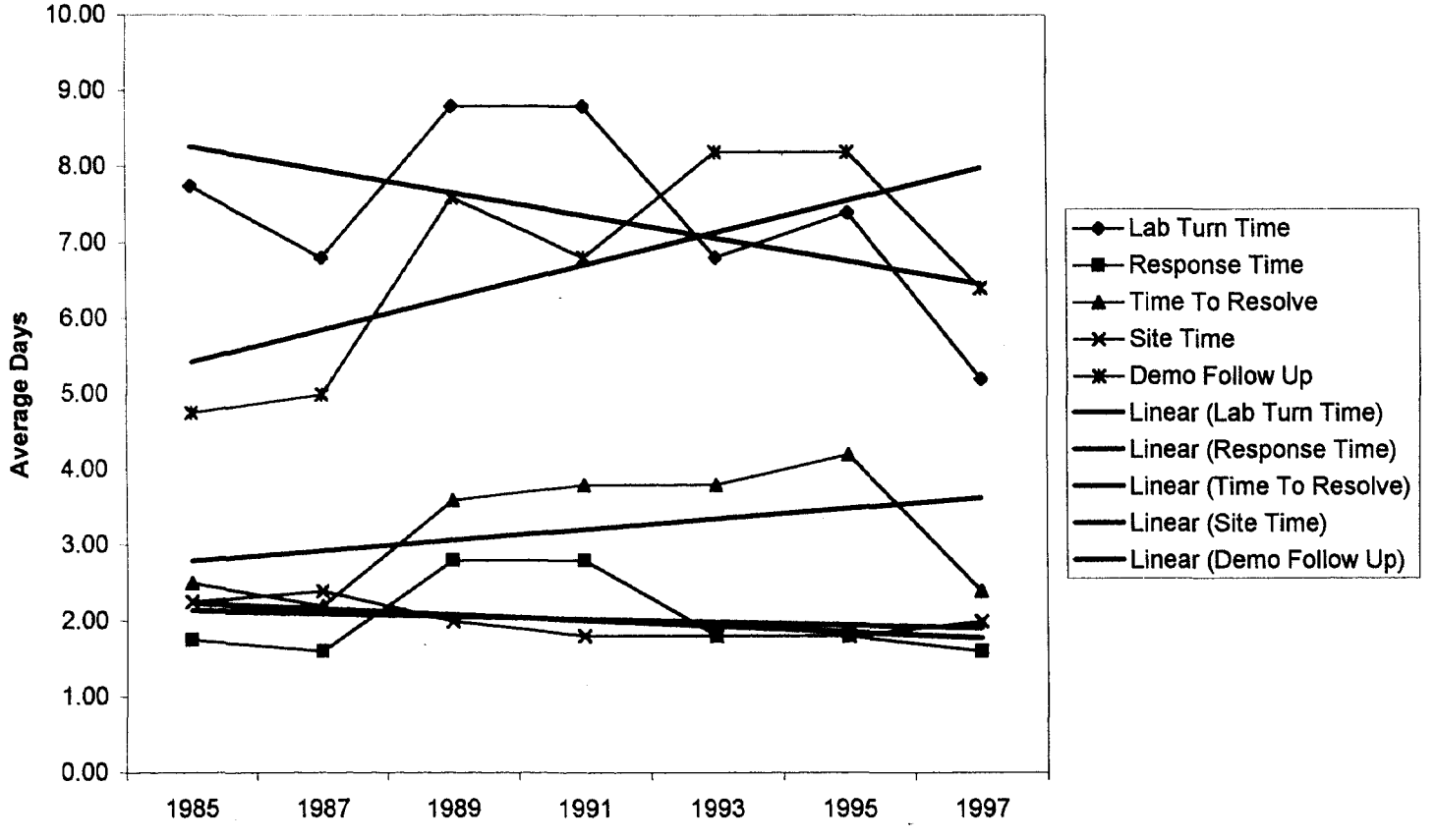
**Graph 3 Knit Team Customer Inquiry Response**



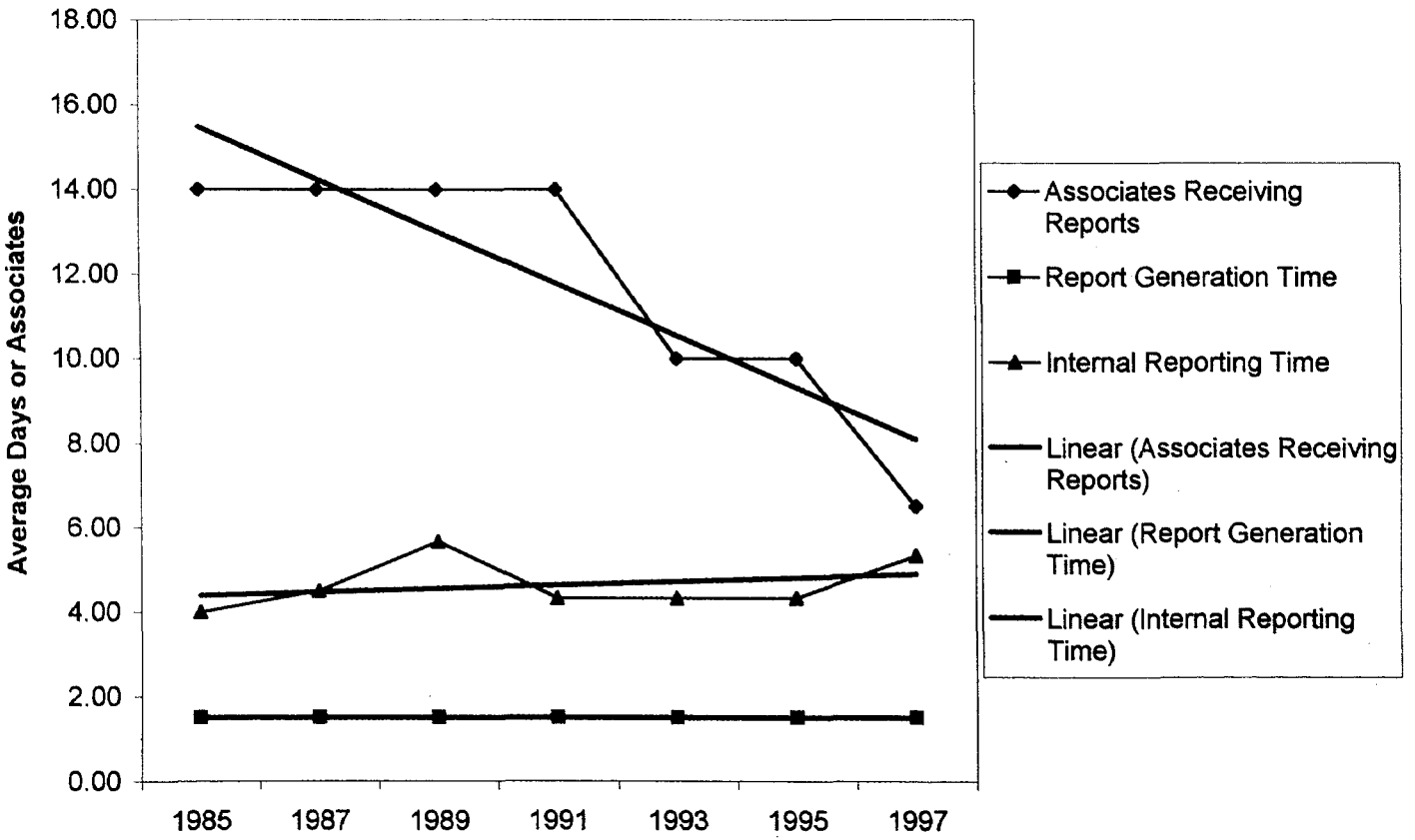
**Graph 4 Woven Team Customer Inquiry Response**



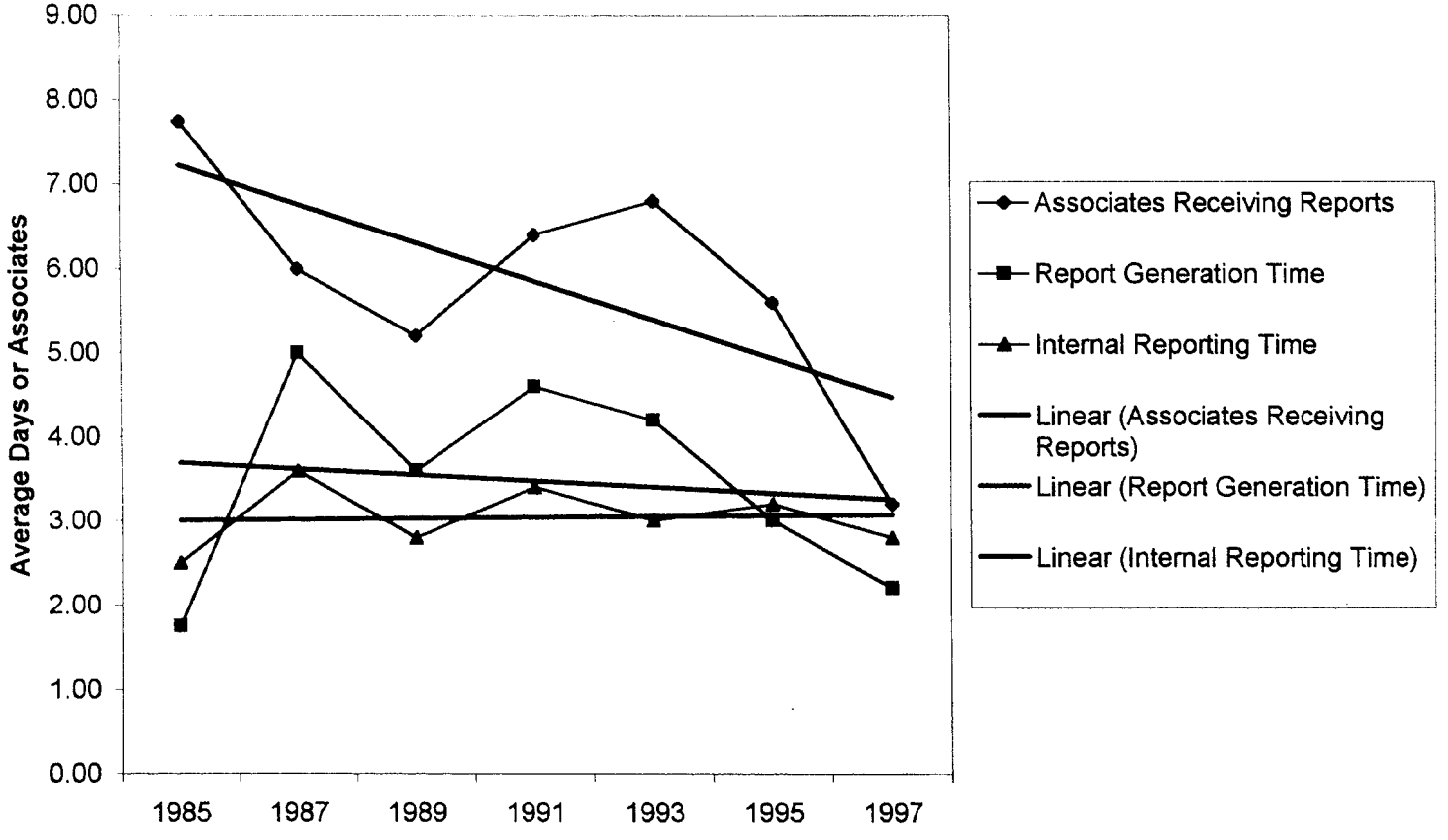
**Graph 5 Specialty Team Customer Inquiry Response**



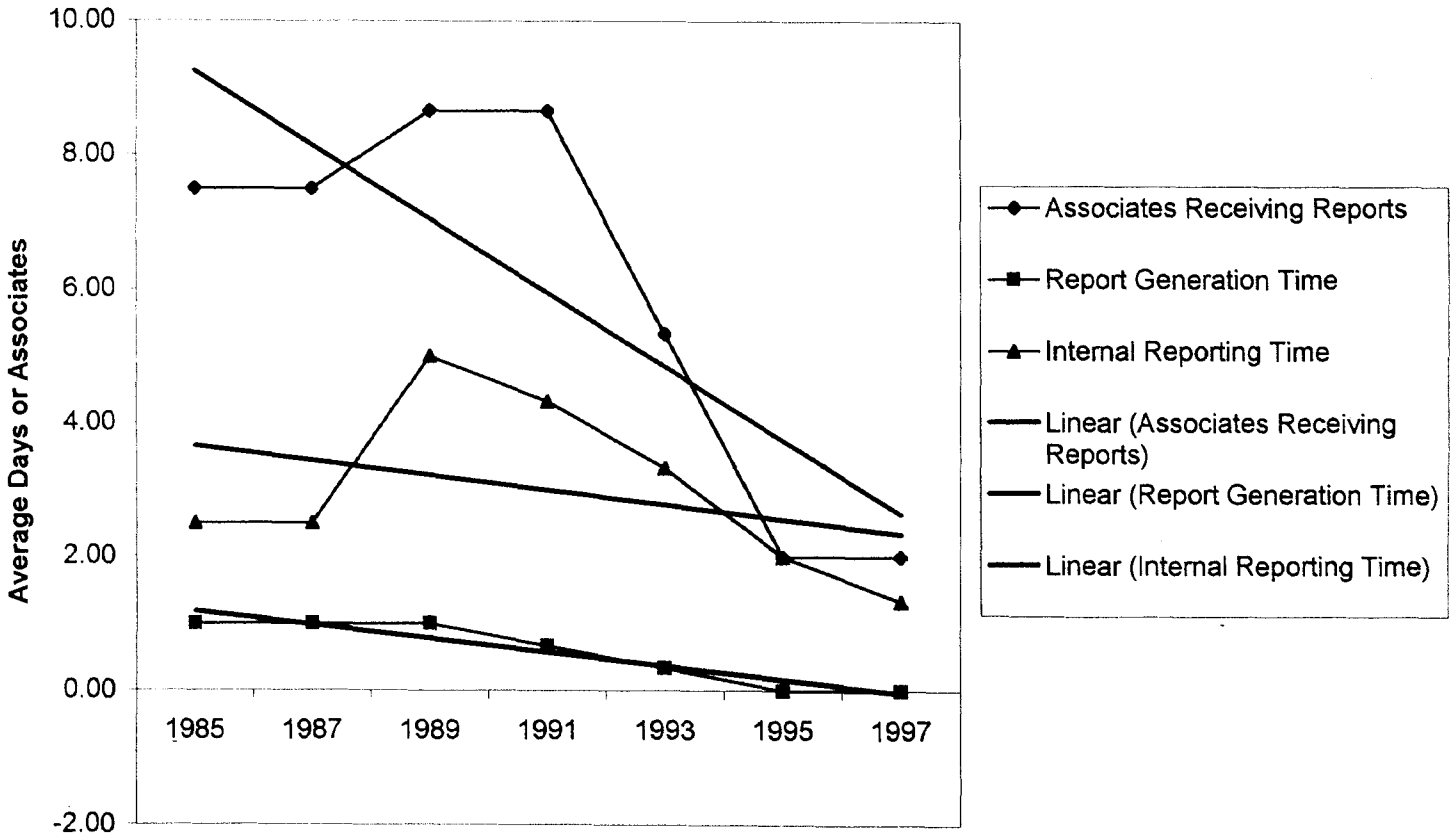
**Graph 6 Woven Team Demo Report Data**



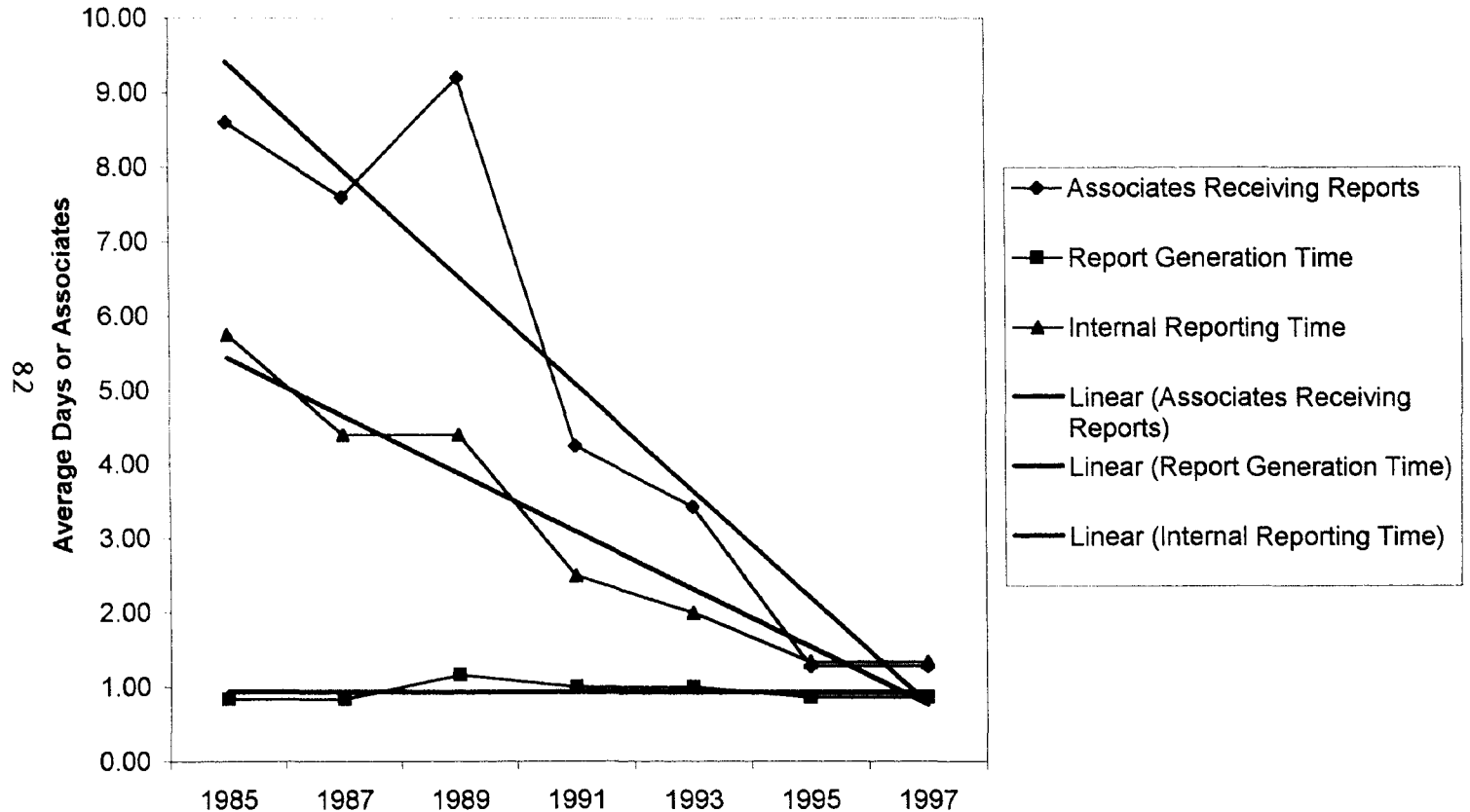
**Graph 7 Specialty Team Demo Report Data**



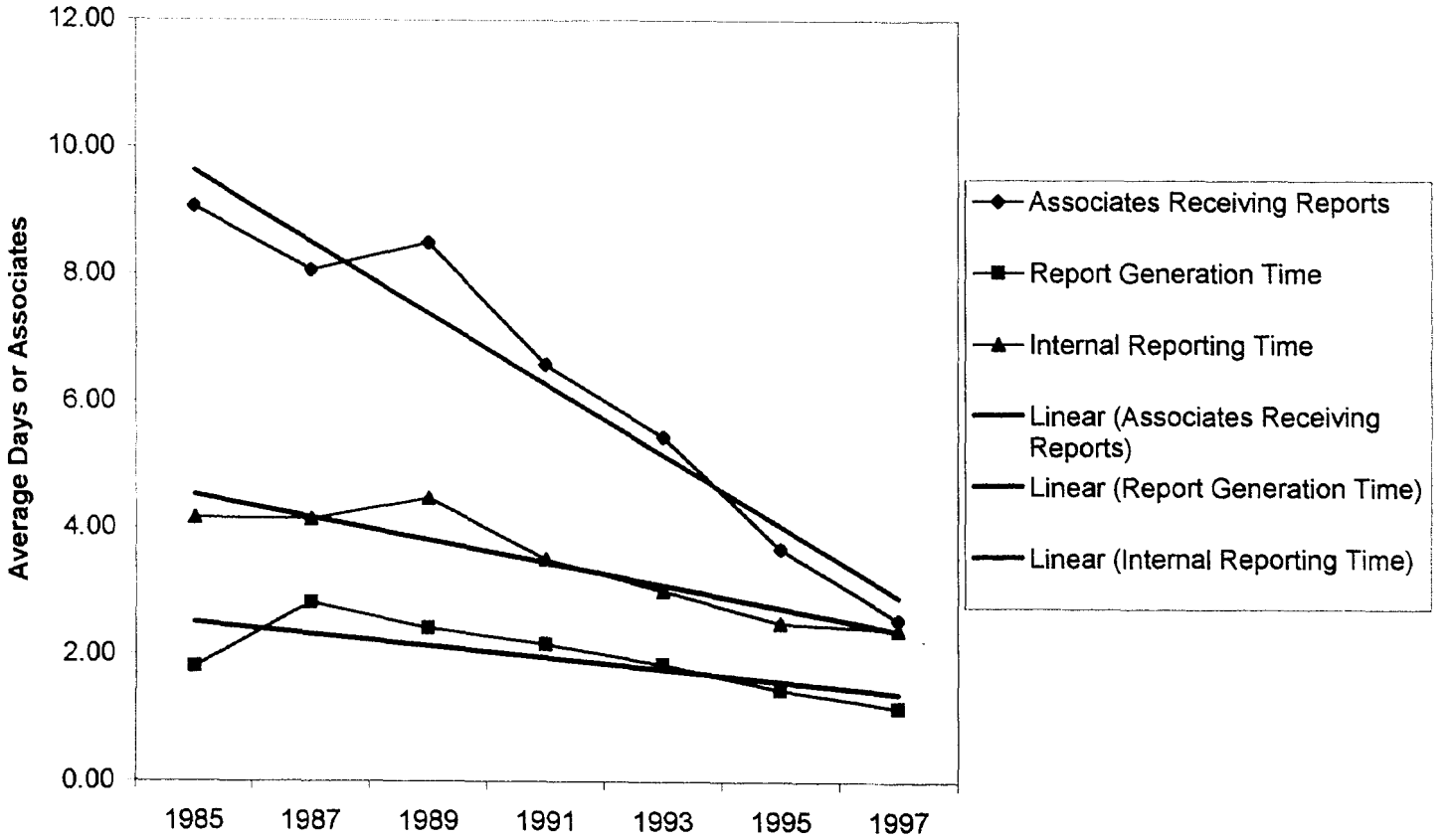
**Graph 8 Knit Team Demo Report Data**



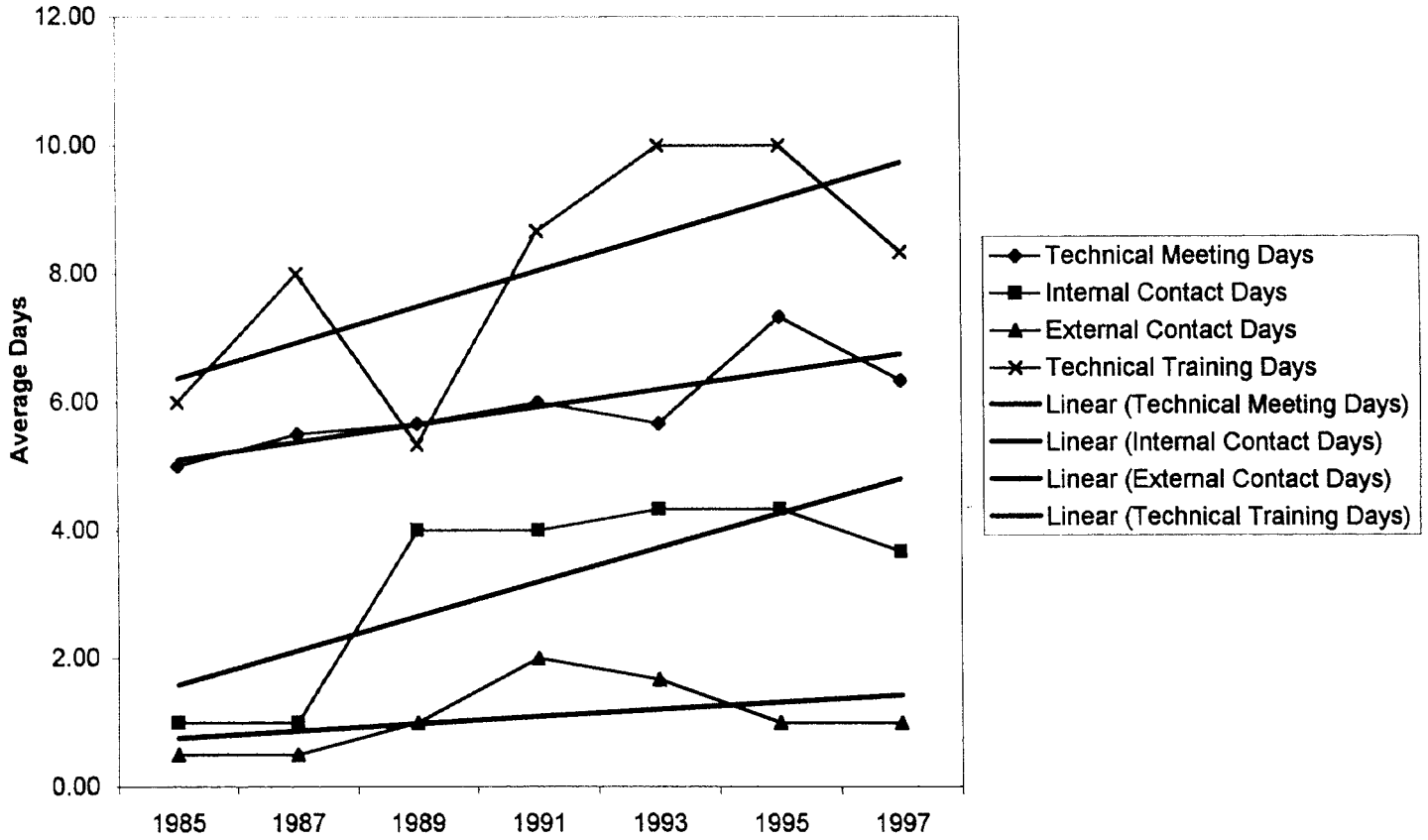
**Graph 9 Commission Distributor Team Demo Report Data**



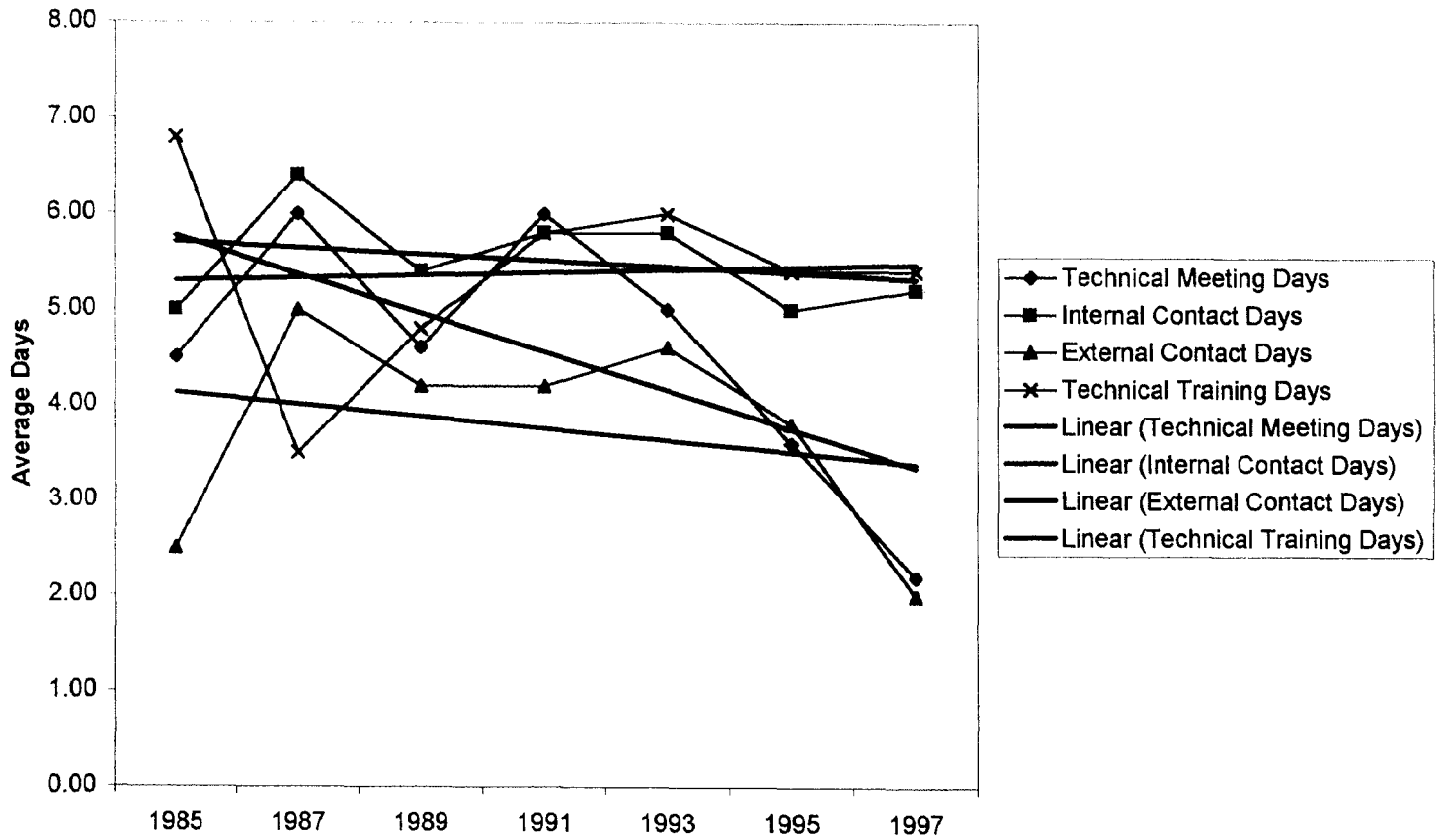
**Graph 10 Aggregate Demo Report Data**



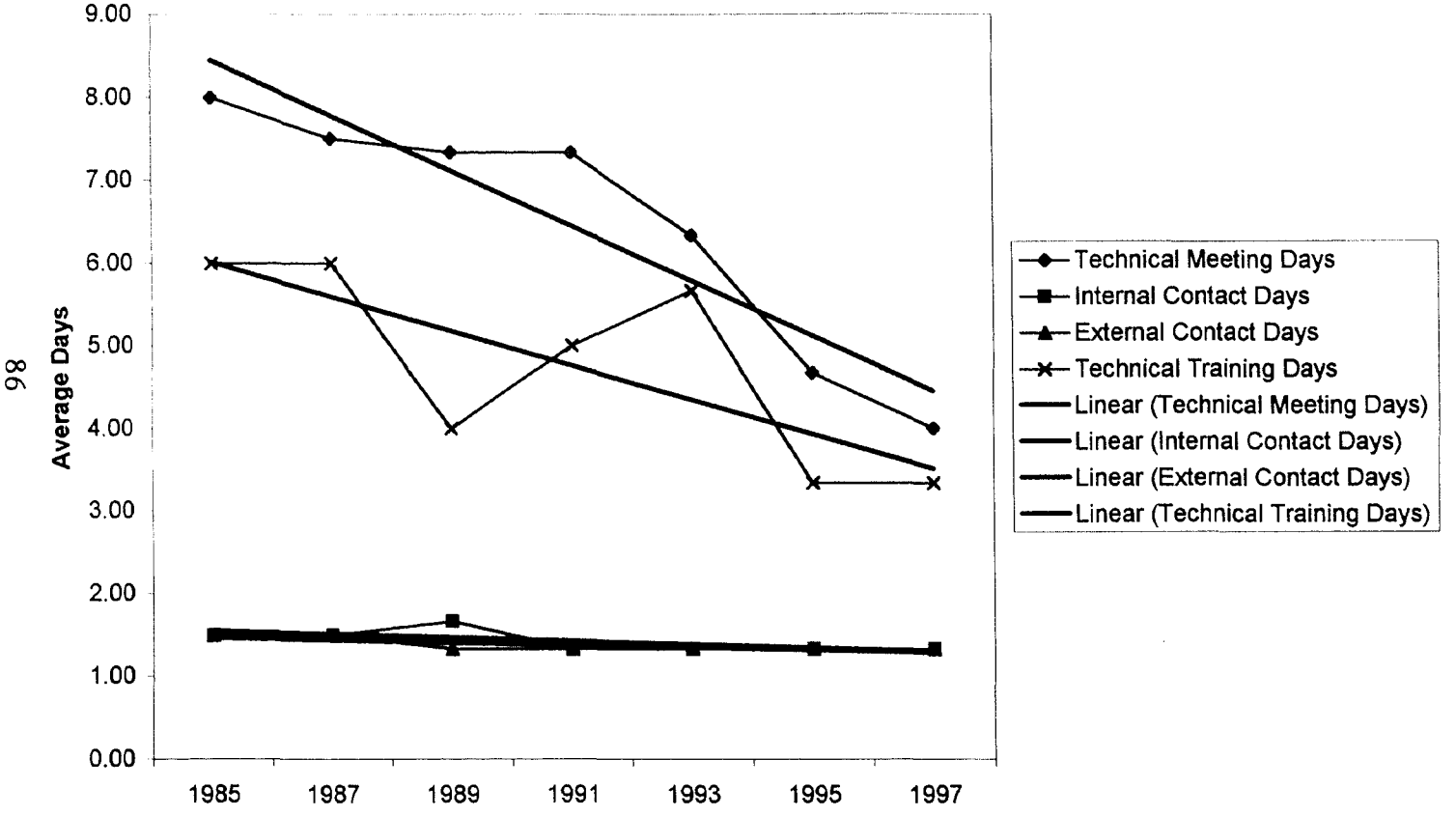
**Graph 11 Woven Team Technical Contact Time**



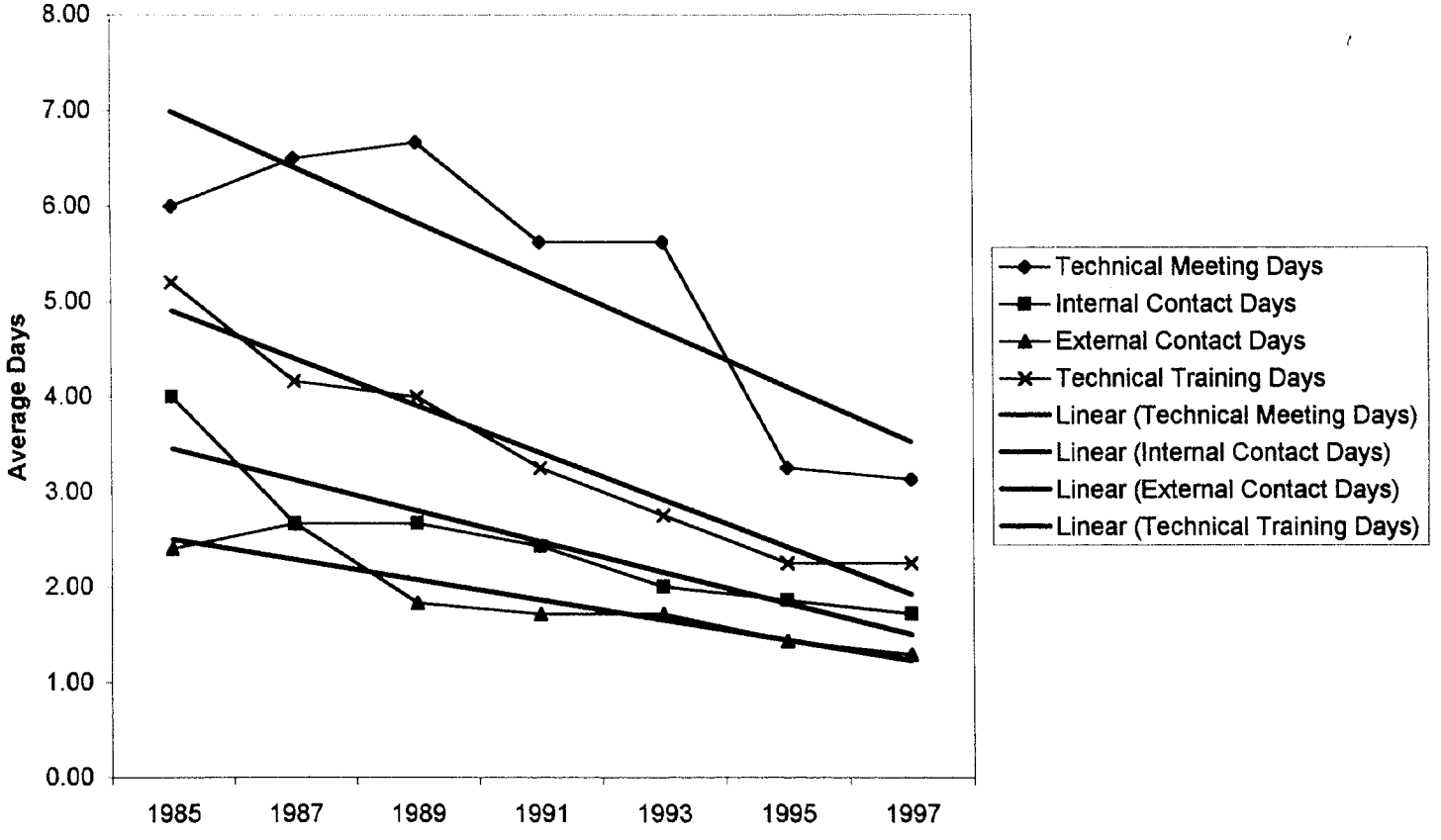
**Graph 12 Specialty Team Technical Contact Time**



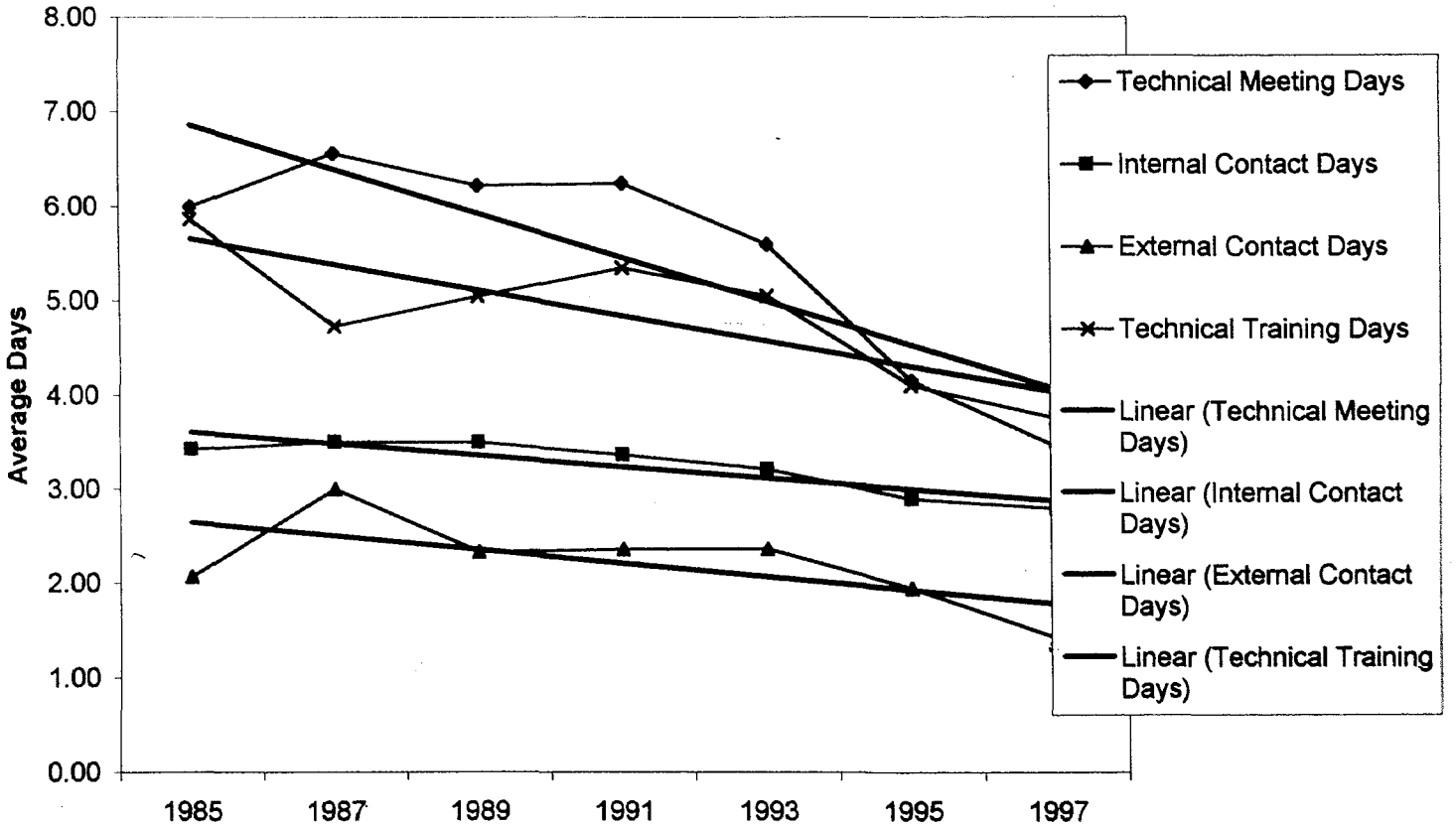
**Graph13 Knit Team Technical Contact Time**



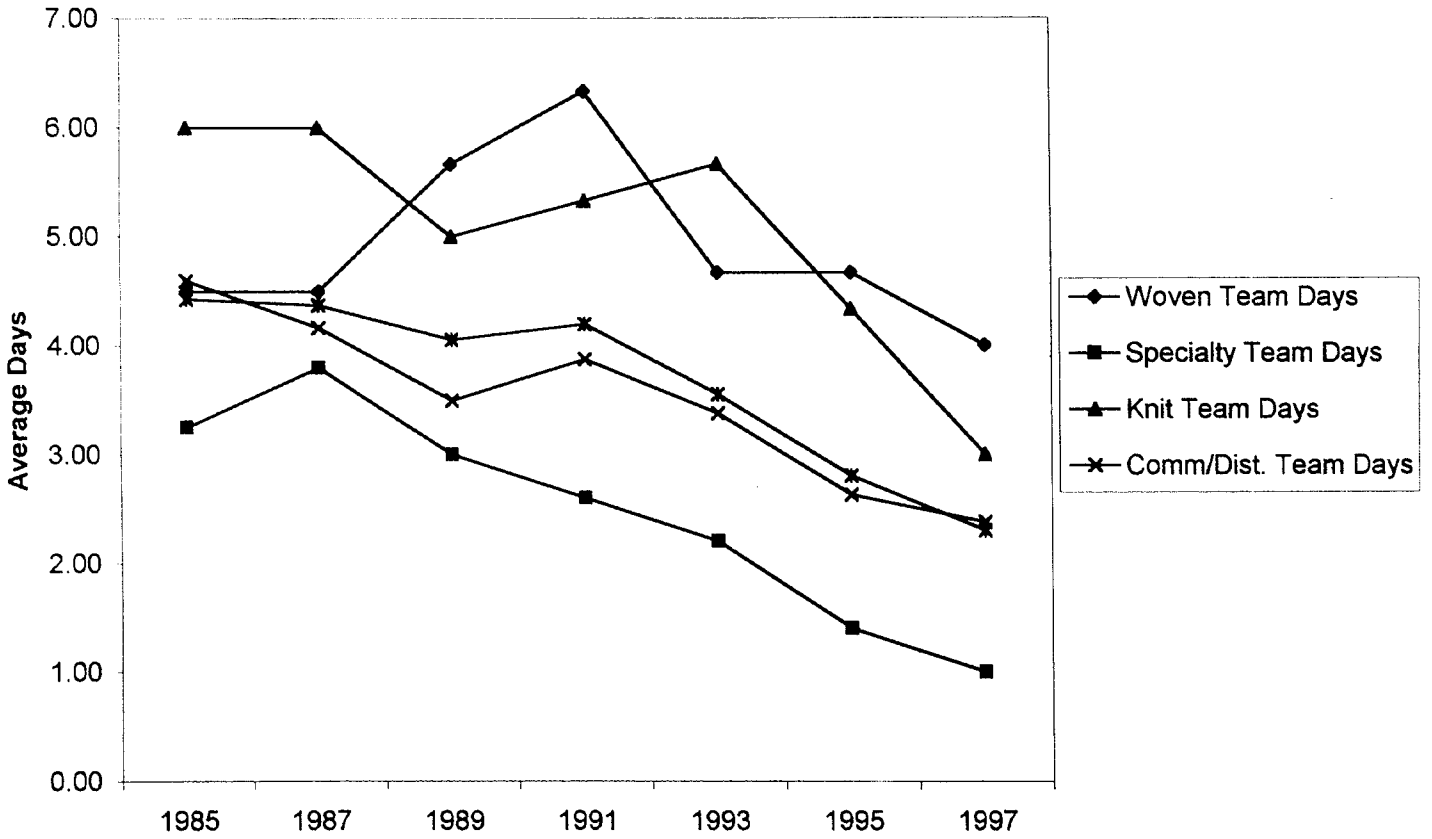
**Graph 14 Commission Distibutor Team Technical Contact Time**



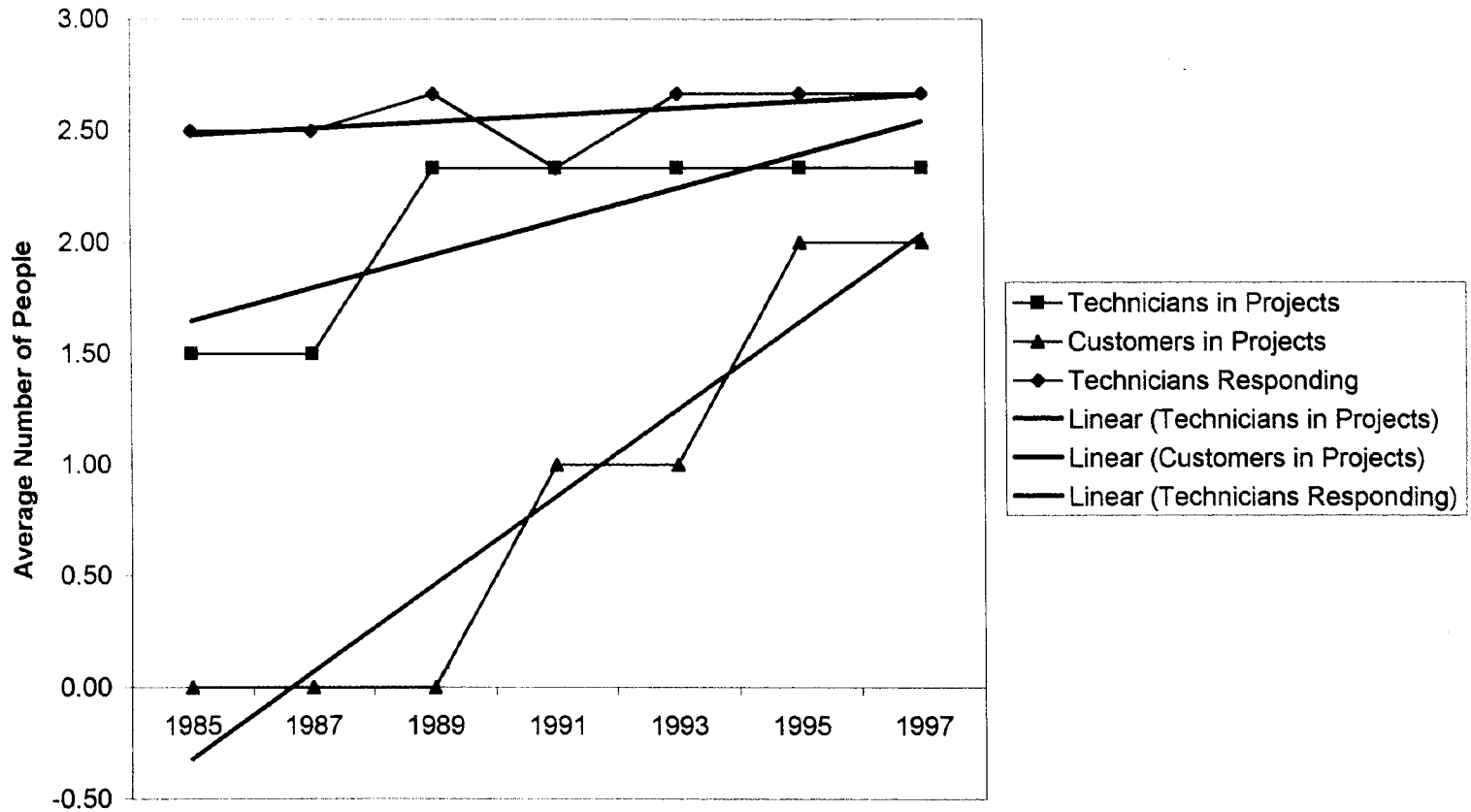
**Graph 15 Aggregate Technical Contact Time**



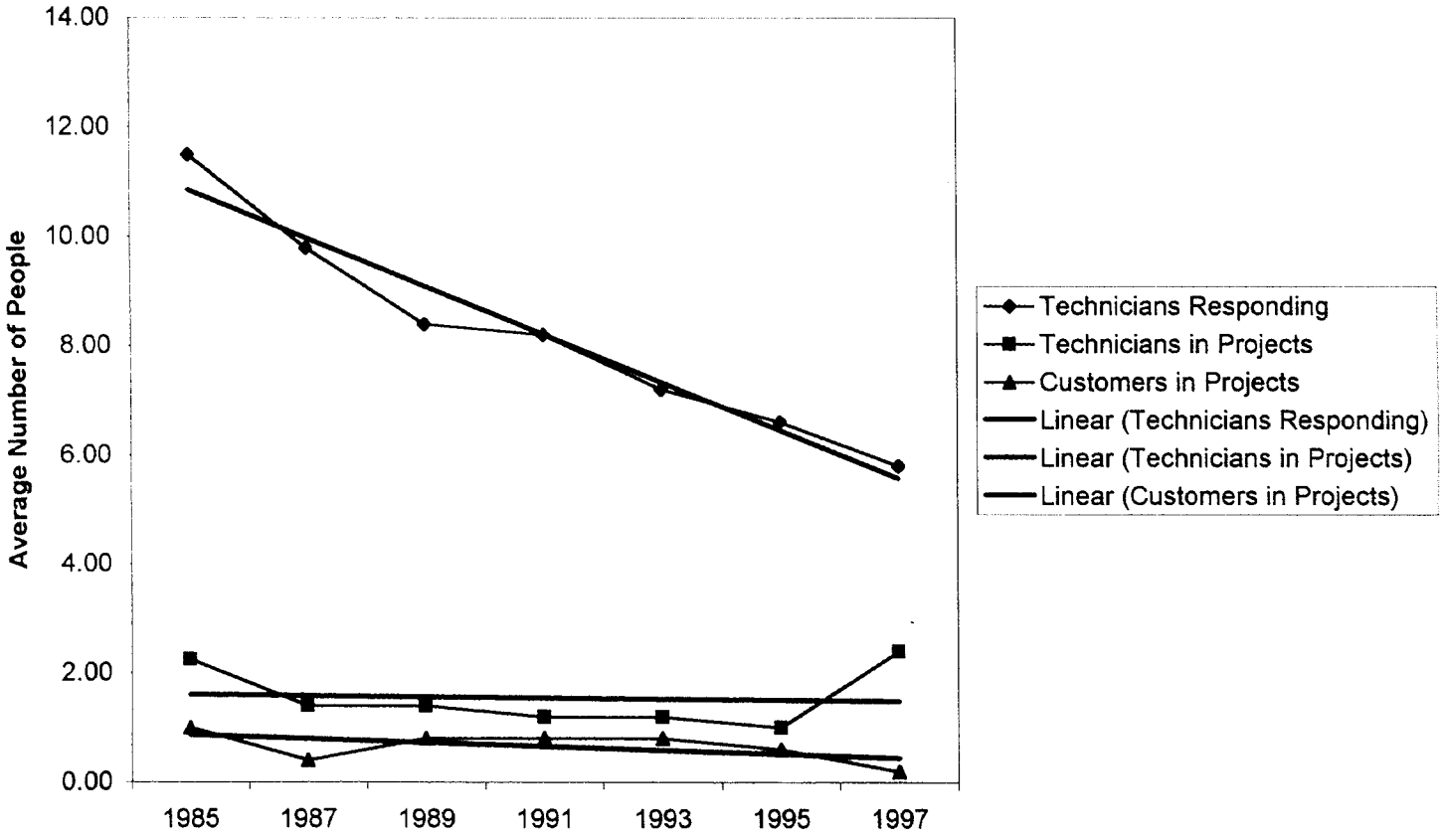
**Graph 16 Product Conference Days**



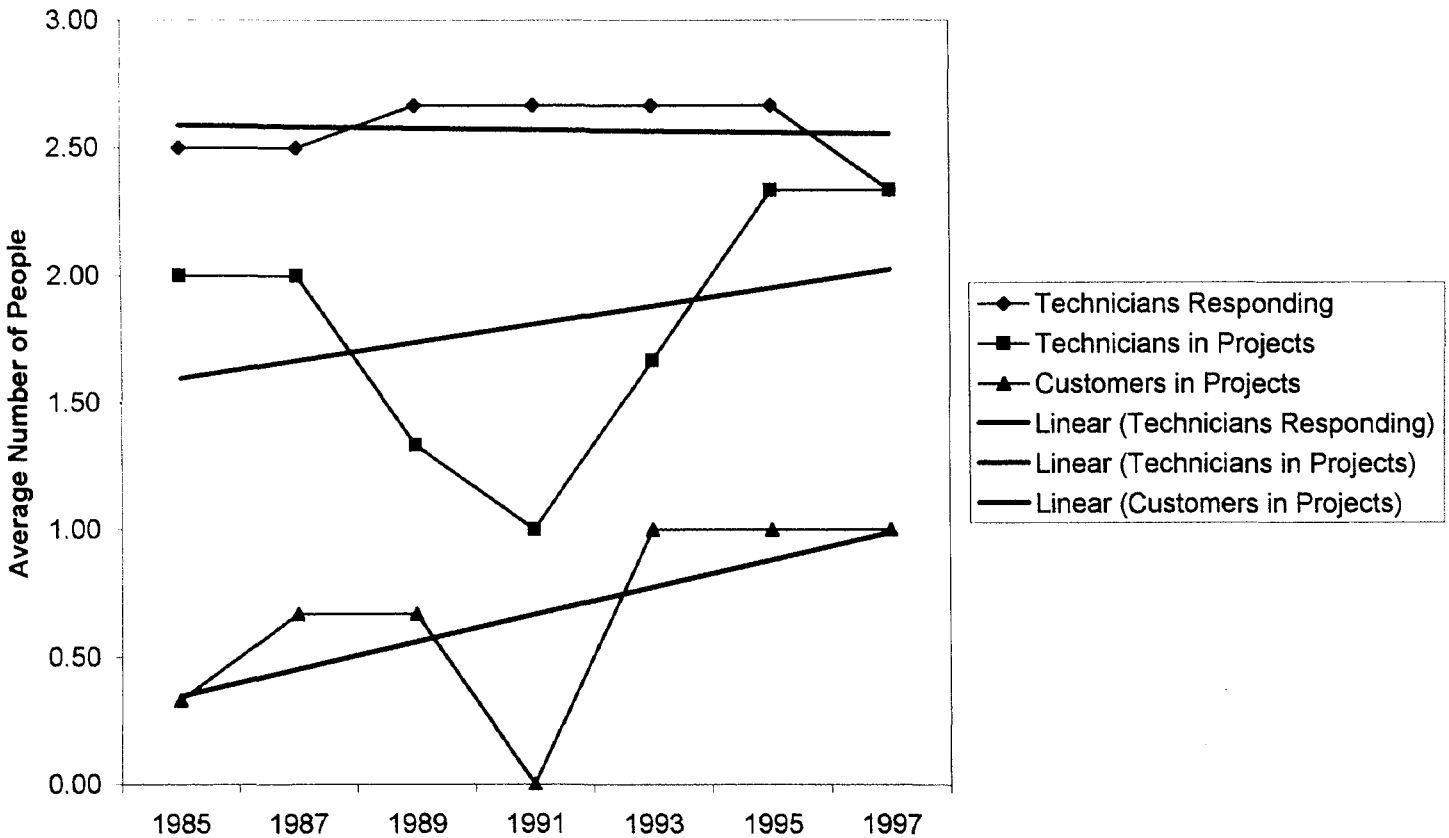
**Graph 17 Woven Team - Size of Effort**



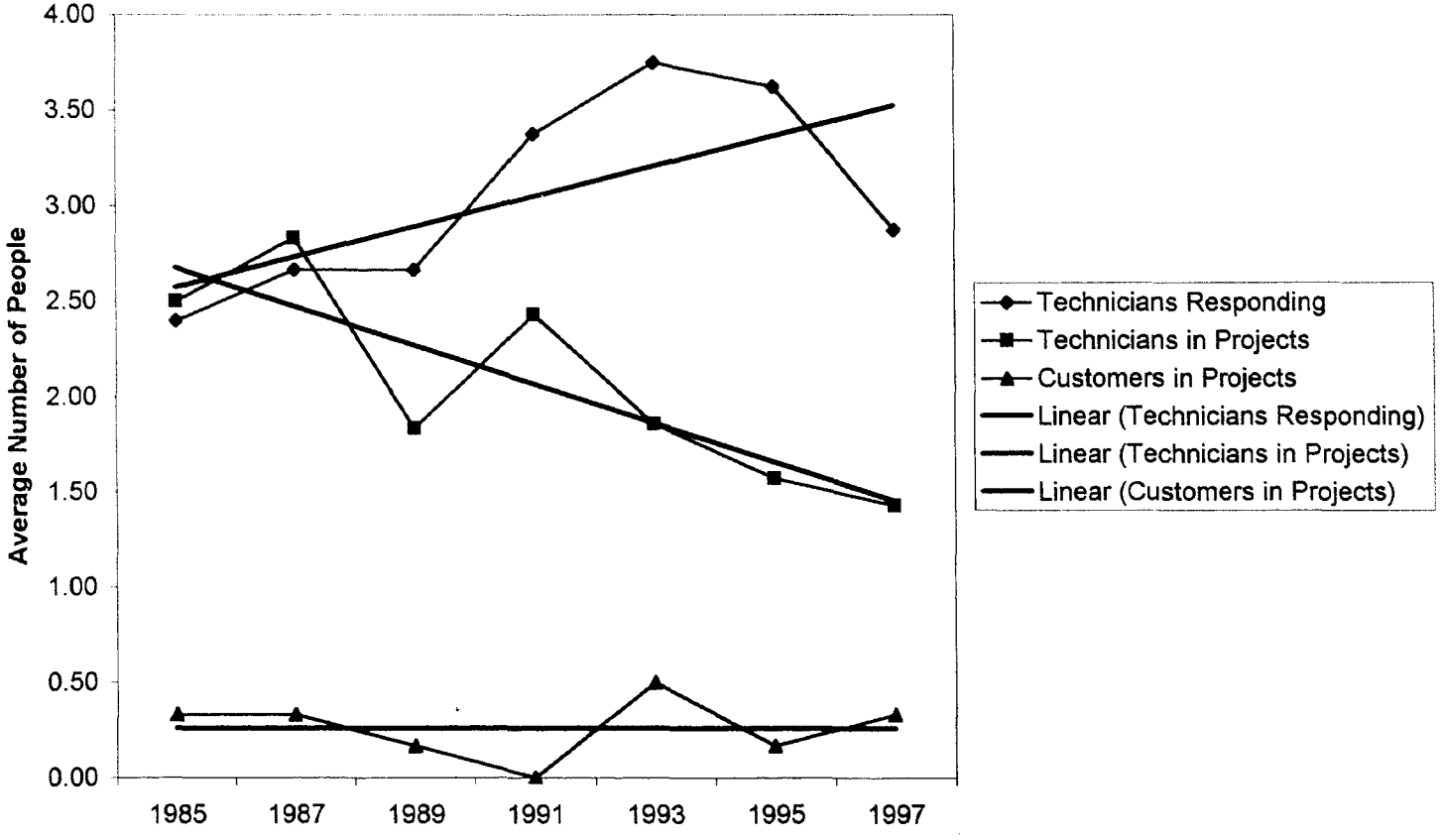
**Graph 18 Specialty Team - Size of Effort**



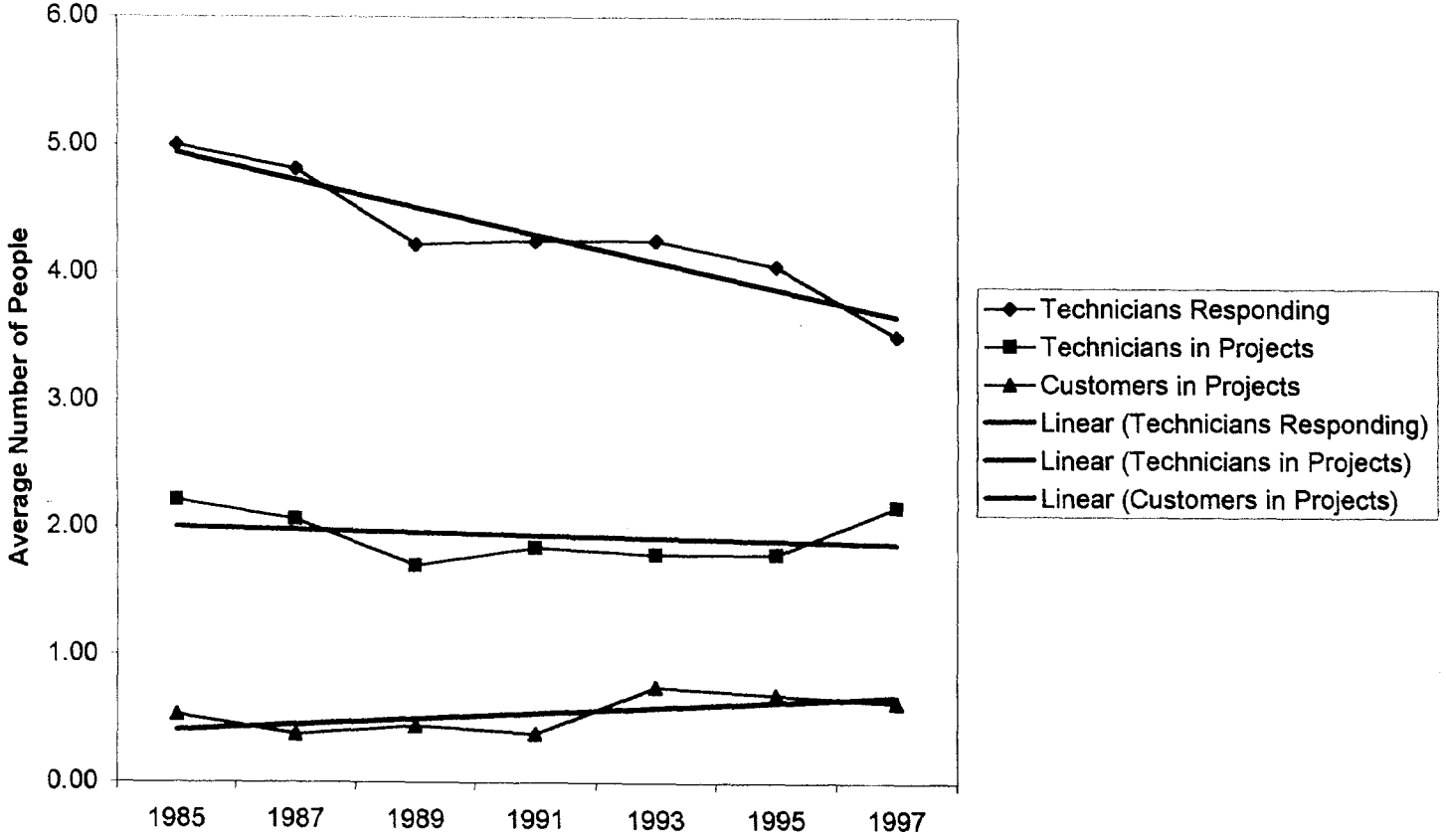
**Graph 19 Knit Team - Size of Effort**



**Graph 20 Commission/Distributor Team - Size of Effort**



**Graph 21 Aggregate - Size of Effort**



## Biography

David R. Fenstermaker

Born in Bethlehem, PA on May 1, 1957 to Roger and Margaret Fenstermaker of Allentown, PA. Currently resides in Bethlehem, PA with his wife Janet and two children, Kristin and David.

Graduated from Moravian College in Bethlehem, PA with a B.S. Degree in Chemistry, 1981. Received the Analytical Chemistry Award from the College.

Employment history includes; Laboratory Manager for American Argo Corporation (1979 – 1981), Technical Sales and Service Laboratory Manager for Sodyeco Division of Martin Marietta Chemicals (1981 – 1984).

He is currently employed by Ciba Specialty Chemicals in the Marketing and Technical Services Group, having held that position since 1985. Maintains membership in the Pennsylvania Apparel and Textile Association [PATA], as well as in the American Association of Textile Chemists and Colorists [AATCC]. He formerly held the position of national council member of the AATCC and currently serves as a member of the sectional committee. He has given presentations and written technical papers for industry symposia and local technical meetings of the AATCC.

END

OF

TITLE