Eastman Kodak Equipment Manufacturing: Three Scenarios

by

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Abstract

Kodak equipment manufacturing and, specifically, the role of Kodak Apparatus Division (KAD), are examined. KAD, Kodak's shared and captive parts supplier organization, competes with outside vendors to supply Kodak Lines of Business (LoBs) with a variety of fabricated parts, ranging from commodity parts to leading edge optical subassemblies and electronic components. KAD has in recent years suffered from a customer perception of low viability compared to much of its competition. Reviews of Kodak history, culture, and business environment are given, and their effect on KAD manufacturing is discussed. It is proposed that KAD's relatively high cost structure is in large part a result of a shift in product from high volume strategically important camera parts to a wide range of complex, cost sensitive, and low volume equipment parts, coupled with a company culture that favored stability and thus relative inflexibility towards these changing conditions.

Three alternate organizational forms for Eastman Kodak equipment manufacturing are identified and evaluated:

Scenario I: KAD remains captive supplier to Kodak LoB customers exclusively but develops its design, fabrication and assembly capabilities to enable it to provide subsystems, instead of single parts or components. Control of KAD resides in a Board comprised of LoB, KAD, and corporate executives.

Scenario II: KAD becomes a number of autonomous and self-contained companies, which have varying degrees of Kodak
ownership depending on each unit's level of strategic importance to the LoBs.

Scenario III: KAD is broken into discrete manufacturing units by customer or group of customers, and control of each unit is transferred to each LoB customer or group of customers.

These scenarios are evaluated by comparison across four dimensions that encompass a breadth of financial, product, human, and organizational factors: financial returns, ability to develop cost-effective quality products quickly, quality of work life, and synergy between units. Critical factors in this evaluation include flexibility to respond to fluctuations in production volume, ease of communication between design, manufacturing, and assembly units, and existence of suppliers with relatively low cost structures.

Scenario II appears to be offer the most flexibility in general and, specifically, with respect to product volume fluctuations, and thus offers relatively high returns on assets and job security. Ease of communication in this scenario is achievable in part through cross-linked ownership. Scenario I and III offer a close connection of manufacturing to product development activities due to the status of Scenario I and III units as part of the Kodak family and the involvement of LoB executives in their governance. However, these two scenarios, particularly Scenario III, have limited ability to adjust to volume fluctuations, limited asset and organizational flexibility in general, and are bound to a cost base that may perpetuate KAD's competitive disadvantage, especially in the production of commodity parts.

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Introduction

Chapter 1

This study presents and evaluates three scenarios for Eastman Kodak equipment development and manufacturing. Each scenario focuses on an alternate organization of parts fabrication and subassembly design, and, more generally, manufacturing activities within the total equipment design, engineering, fabrication, and assembly effort. These scenarios are based on Kodak Apparatus Division (KAD), a shared captive supplier of parts to Kodak business units. This study is based on the premise that the viability, particularly of the mechanical product related areas, of KAD is questionable given its present asset base, structure, and customers. Its goal therefore is to identify and evaluate organizational structures and associated business and manufacturing strategies consistent with Kodak corporate strategy whose application should enhance the competitiveness of Eastman Kodak equipment businesses.

This chapter outlines and briefly describes the content of the remainder of this study. In Section 1.1 the history of Eastman Kodak Company and the relevance of that examination to the present investigation is described. Each of four major parties in equipment manufacturing are presented and their roles and interaction are described. Relevant
previous work including KAD-internal studies, contract studies, and related literature is described in Section 1.2. An overview of the remainder of the report is given in Section 1.3.

1.1 Background

1.1.1 Equipment Manufacturing at Eastman Kodak

Eastman Kodak Company is best known for the ubiquitous little yellow boxes of film that bear its name. However, while film and other sensitized materials continue to be its most profitable major business, Eastman Kodak\(^1\) is almost equally involved in the manufacture and sale of equipment that cumulatively accounts for several billion dollars in annual revenues. While sales of film and other sensitized goods have remained relatively stable, sales (and thus manufacture) of equipment have shown significant volatility, marked by a decline in Kodak camera manufacturing in the early to mid 1980s and a concurrent rise of non-camera equipment manufacturing.

Two distinct changes in the business environment have had strong impact on those Kodak units involved in equipment manufacturing. First, the change in the type of equipment manufactured has caused problems. Production of non-camera equipment has required substantially higher levels of performance from KAD. Unlike cameras,

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\(^1\)Eastman Kodak Company, Eastman Kodak, and Kodak will be used interchangeably in this report, except where indicated otherwise.
this new equipment has a weaker strategic link to the "bread-and-butter" film and photographic paper business, must be sold on its own merits, and, in general, requires higher levels of cost and quality performance to be competitive. Unlike the camera business, emphasis in these equipment businesses on traditional Kodak strengths of distribution and trademark is decreased. Also, the diversity of the manufacturing technologies and processes required for these new businesses, because of the products' increased technological complexity, wider range, and increased number, exceeds that of the camera business and appears to strain the capacity of the current manufacturing facilities to provide it.

Second, the increased competitiveness of the markets in which Kodak competes has required it to significantly increase its overall level of performance. This has led to sweeping changes as Kodak tries to alter a culture and business habits borne of nearly a century of monopoly-status in its primary film markets. A sweeping 1985 corporate reorganization transformed a centralized and functionally distinct organization into a group of autonomous business units active in the equipment and film businesses, and a shared fabrication organization - Kodak Apparatus Division - that acts as captive supplier to the business units. The autonomy gained by the business units in 1985 resulted in an asymmetric relationship between KAD and the LoBs, in which KAD remains captive to the LoBs but the LoBs have freedom to purchase from external vendors. A result of these changes in KAD's environment is the severe competitive pressure on KAD that provides the major impetus for this study.
1.1.2 Four Players in Equipment Manufacturing

Four major parties are involved in Eastman Kodak equipment manufacture, (1) Kodak Lines of Business (LoBs), (2) KAD their internal supplier of parts and services, (3) their external parts suppliers, and (4) the corporate parent. The relationships and transactions between these players are a focus of this study.

Lines of Business

Eleven Kodak LoBs with cumulative yearly sales of several billion dollars are committed to the development and manufacture of equipment ranging from cameras, microfilmers, and clinical analyzers, to copiers. These LoBs typically engage in a full range of product and market research, product development, intermediate and final assembly, marketing, sales, and service activities. However, these LoBs engage in only a limited range of fabrication activities, choosing instead to acquire the bulk of their equipment parts from internal sources (KAD) or from external vendors. Figure 1.1 presents a schematic of generic manufacturing value chain activities and a rough breakdown of the vertical integration choices the LoBs have made. The width of the bars in Figure 1.1 is roughly proportional to the level of activity.

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2Only non-OEM equipment is included, and several function such as raw material production, pure research, and sales which are of secondary interest here have been omitted.
Although KAD as a whole is the largest single supplier to LoBs, a large fraction of parts fabrication contracts is awarded to external vendors. KAD does only a small amount of final assembly work.

**Kodak Apparatus Division**

In mid-1989, KAD is an organization of approximately 5000 people, approximately two thirds of whom are involved in the fabrication of components for equipment manufacturing LoBs, the remaining providing support such as building, accounting, and materials management services to those LoBs collocated at the KAD site. The manufacturing facilities comprise a diversity of resources and capabilities ranging from production of mechanical parts to development and production of optical assemblies and electronic boards.
KAD was severely impacted by the reorganization of 1985. Whereas it enjoyed a status approaching that of a sole supplier of parts prior to this date, particularly for camera parts which comprised the bulk of its value added at this time, it was increasingly required to compete with outside vendors after 1985. While it has been partly successful in making this transformation serious questions about its cost effectiveness and hence its viability remain. KAD has suggested that in order to be viable it must concentrate on higher value addition by provision of high level subassemblies rather than its traditional parts deliverables. This situation and KAD's vision of its future are at the core of this study.

External Suppliers

External vendors provide parts for LoB equipment in direct competition with KAD. Market penetration of these vendors varies from very high (60-90%) in the area of mechanical products to very low (1-10%) in electronic products.

Corporate Management

Corporate management sets the financial goals through an interactive process for all of the organizations involved in manufacturing and possesses ultimate authority over these organizations.
1.2 Previous Work

At least three previous investigations are pertinent to the current study. Two of these are studies commissioned by Kodak Apparatus Division to (1) examine redesign of the KAD "mess", and (2) analyze strategic value and profitability of each of its divisions. The third investigation is the general class of literature available under the rubric "theory of vertical integration". A brief outline of these areas of work is given below.

1.2.1 The Mess Team: System (Re)Design of KAD

In 1986, management of KAD convened a "Mess Team" consisting of a number of KAD employees and charged it with the goal to "create organization management would like right now if current facilities 'burned down'" [Zaffino 1989]. Their work in fact included an analysis of the organization, definition of a mission, and design of idealized system and organization structure. Their analysis and recommendations were apparently well received by management, and a number of their suggestions seem to have been implemented.

While this work provides a useful compendium of data about KAD, it is fundamentally different from this study in its usage of a KAD perspective from which to view the data. The question posed at the outset of that study in effect limited the search for solutions to a relatively narrow
subset, that is those acceptable to the then current management. The present study, in comparison, takes an Eastman Kodak perspective and considers a broader range of possibilities.

1.2.2 United Research Company: Strategic Analysis of KAD

In late 1986 KAD contracted a management consulting firm, United Research Company (URC), to evaluate its manufacturing operations [URC 1987]. This firm conducted an extensive analysis of each of 19 product/technology groups at KAD. Competitiveness of each group and potential profitability ranges were calculated based on comparisons of industry and KAD data. Surveys of LoB customers allowed estimation of their requirements and thus of KAD's strategic value. Results were presented on a standard two-dimensional matrix.

While this analysis gave an extensive survey of KAD's competitiveness and value to LoBs, URC provided only rudimentary suggestions (eg. divest, spin-off, etc.) that may not have been perceived as viable alternatives by the organization. The present study tries to go one step further in the analysis by considering history and culture of the organization, both important determinants of the organizations capacity

\[footnote{This is understandable given the KAD's virtual crisis situation at that time, and the immediacy of tangible performance issues such as delivery rates of less than 20% that could be tackled without consideration of fundamental changes in the organization of KAD and in the relationships between KAD and LoBs.} \]
for change, and by defining and evaluating specific organizational alternatives that might fit into a Kodak framework.

1.2.3 Vertical Integration Choices in Manufacturing

While this report deals with the specific topics of equipment manufacturing and equipment manufacturing strategy at Kodak the central issue is generic: What vertical integration decisions are optimal for a given manufacturing company and why? This issue is one that has long attracted scholars of business management, and a large body of literature dedicated to its exposition exists. Unfortunately it is an issue that has also resisted successfully efforts to render it tractable, and no unified theory of vertical integration exists that might be of general applicability. Thus, this literature is of little assistance in the present study.

1.3 Overview

This report is divided into three parts. Part I defines the setting in which equipment manufacturing at Kodak is to be evaluated. Chapters 2 and 3 present a history of Kodak, of Kodak equipment manufacturing, and of the changing role KAD in the company. Since the Kodak culture is of pervasive influence, this is also described. Chapter 4 proposes three alternate equipment manufacturing scenarios. Each of these represents an alternate system of organization of equipment manufacturing
activities. Scenarios I and III are modeled after two popular Kodak-
internal visions of the future of KAD. Scenario II is modeled after a
"hierarchical" organization of companies observed in the Japanese
electronics and automotive industries. As a group these scenarios
present a wide range of organizational options. They serve to provide
focus for the remainder of the study.

Part II contains the bulk of the evaluation. Four dimensions that
comprise the framework in which these scenarios are to be evaluated are
presented. They are the scenarios' effect on Kodak returns on assets,
timely introduction of cost effective quality products, "quality of work
life" of employees, and on the synergy between different KAD units.
The dimensions are applied and discussed in successive chapters.

Part III presents a summary of the conclusions of the evaluation in Parts
I and II.
PART I

Description
Eastman Kodak Company

Chapter 2

This chapter gives an overview of the Eastman Kodak Company, of its structure, history and culture, and of the competitive environment in which it operates. Its purpose is, to paraphrase one author, to describe the company history so as to give a basis for understanding the present. It will be argued in a later chapter that the reduction of the strategic role of Kodak camera manufacturing, the increase in the competitiveness of sensitized goods markets and subsequent deteriorations of the Kodak bottom line, and a tradition of corporate paternalism that may inhibit change are at the core of many of the present day issues involving equipment manufacturing and the Kodak Apparatus Division.

An outline of the chapter is given in Figure 2.1. Four "branches" or sections describe respectively, company history, culture, nature of competition, and present status.
The chapter begins with a brief history of the Eastman Kodak Company, and a discussion of the evolution of the Kodak camera and the growth of the Kodak equipment business. Section 2.2 continues with a discussion of the Kodak culture, arguably a critical component in the determining Kodak’s ability to respond to changes in the business environment, and the paternalism and centralization that has long characterized it. Section 2.3 describes the business environment in which Kodak operated, the changing roles of film versus camera and of non-camera equipment, and, briefly, the threat of electronics-based imaging. Finally the organizational structure of the company is examined, a major corporate restructuring of 1985 is discussed, and a sketch of the company circa 1989 is given.
2.1 A Brief History of Eastman Kodak

2.1.1 George Eastman to Eastman Kodak - The Early Years

George Eastman is widely recognized for playing a key role in the development and popularization of photography. In 1879 he laid the basis for what was to become the Eastman Kodak Company by developing the technology and constructing the machinery for coating gelatin dry plates [Holmes 1930A] to be used in the photography of the day. Financial support from Henry A. Strong and technical assistance from a British plate sensitizing firm helped Eastman’s company overcome some initial difficulties and become a producer of sensitized dry plates and photographic papers [Alt 1986A].

Eastman second major contribution was to the development of a paper film [Ackerman 1930A] which could be incorporated into existing dry plate cameras with the use of a roll-holder developed by Eastman in collaboration with William H. Walker, a former camera maker. These developments led to a new “system” of photography, the “Kodak”, a small portable box camera with roll-holder and film. A number of developments followed such as the development of a celluloid-based film, and of improved photosensitive emulsions.
While other cameras existed in the mid 1880’s, the Kodak, due to its small size, relative simplicity, and reasonable cost made photography accessible to common people. Twenty five dollars bought the camera, carrying case, and enough Kodak paper film to make 100 exposures. Upon completion of the film, camera and film where returned to the Kodak factory in Rochester, where for ten dollars the film was developed and the camera was reloaded for the next hundred exposures. During the years that followed this introduction, the company expanded its offerings by producing a number of products based on the Kodak using either roll or cartridge film, until by 1896 over 100,000 cameras had been sold.

Eastman’s business acumen was as important, if not more important, to the development of the photography market as his (and the company’s) technical prowess. Key elements of the Eastman Kodak business strategy were use of aggressive and innovative marketing programs, rapid expansion into international markets, pursuit of economies of scale, particularly in the manufacture of film and other sensitized materials, and acquisition of possibly relevant patents or of the companies that held them [Alt 1986B]. Kodak’s preeminent position in the photographic market is evidence of the strength of its products, production facilities, and business strategies. By 1912 Kodak enjoyed a US marketshare of 86% in cameras, 88% in film, and 67% in photographic papers [Alt 1986C]. By 1932 Kodak controlled 75% of world photographic industry volume and 90% of world profits.
2.1.2 Evolution of the Kodak Camera

Coated plates and the chemistry that defined them were the early focus of Eastman. 'But in those days', Eastman recalled [Ackerman 1930B], 'one did not “take” a camera; one accompanied the outfit of which the camera was only a part'. It was not until the development of paper film and the roll holder four years later that the camera became a focus of development activities on par with film. This was due in part to the need to tailor the camera to the film and in part to the evident potential for drastically reducing the complexity of photographic equipment. A result of these development activities was the family of cameras beginning with the Kodak and continuing with the pocket Kodak and the folding pocket Kodak [Holmes 1930B] that led to Kodak's near monopoly position in film and camera markets by 1912.

Even at the time of its dominance in the camera market, however, the fortune of the company relied primarily on income from the sale of film. While substantial economies of scale are inherent in the continuous flow manufacturing of film, giving Kodak, the market share leader, substantial pricing leverage and potential for profitability, these economies are not easily obtainable in the manufacture of cameras. Eastman appears to have recognized this. He believed that every camera should be good for at least twenty spools of film [Ackerman 1930C] and that therefore Kodak ought to make at least as much from the film as from the camera itself. Also,
Eastman realized that in time other manufacturers would provide cameras that would use Kodak film or film cartridges.

For many decades, cameras did play a major strategic role in the companies' good fortunes as a vehicle for film sales. A description of this role and the effects of its loss are described in Section 2.3.2.

2.1.3 Growth of Eastman Kodak Equipment Businesses

Although Kodak is renown primarily as a manufacturer of cameras, film, and other sensitized goods, the company has been involved in the design and manufacture of other kinds of equipment for many years. Most of this equipment was related in some way to film or the chemical processes underlying it. For example, Kodak has long produced slide projectors, it is a dominant player in the microfilm equipment market, and was an early entrant into the duplicator business in 1953 with a machine called Verifax which utilized a wet process for photocopying. Of these, the Kodak copier business (albeit with a new technology) has become the most successful, with sales in 1989 approaching two billion dollars.

The manufacture, marketing, and sale of these new products leads to fundamentally different business challenges. Unlike cameras, the individual products are of high value. Customers are industrial as opposed to mass market and require corresponding distribution and marketing efforts. Also, the competition is more intense. Kodak did not
have head start in most of the required technologies, except for optics, nor
does it possess anything near the market share it possessed for many years
in the camera industry. And, particularly for those products that do not
utilize sensitized goods, the equipment itself, not the disposables it will
consume, is the focus of the competition.

2.2 Father Kodak - The Company Culture

At Eastman Kodak, there is a distinct Kodak style, a distinctly “Kodak”
executive, in short, a culture that is deeply entrained in virtually all
spheres of the company. It is a culture that until recently was
characterized by paternalism towards employees and even towards the
town of Rochester, centralization of power at the corporate level over
vertically integrated production organizations, and almost exclusive
reliance on promotion from within to fill even low level managerial
positions. A number of factors have played major roles in the evolution
of this culture. While it is deeply rooted in the philosophy and personal
philanthropy of George Eastman, it is also shaped by Kodak’s preeminence
in the Rochester area and by its long-term possession of monopoly status
in photographic markets. Different aspects of the Kodak are discussed
below.
2.2.1 Paternalism, Centralization of Power, Vertical Integration

Paternalism, centralization of power, and a tendency towards a high degree of vertical integration characterize the Kodak culture. George Eastman was the model of a benevolent and paternalistic company father and set the stage for the company culture by his personal philanthropy. In 1899 he gave trusted employees, his attorneys and personal financial advisor a total of $180,000 of an early personal profit [Ackerman 1930D]. This bonus was made policy in 1912 when Kodak was one of the first US companies to institute an annual wage dividend, which is still in force today [Ackerman 1930E]. In addition, Eastman instituted suggestion program which paid employees for their good ideas [Ackerman 1930F], and in 1919 contributed 10,000 shares to an employee stock ownership program that eventually made employees as a group the largest stockholders of the company [Ackerman 1930G]. While these activities occurred nearly a century ago they were codified into policy and continue to be in effect.

This culture of paternalism extends as far as the City of Rochester, site for Kodak’s corporate headquarters and for a large portion of its manufacturing facilities. Kodak’s size in Rochester gives it a compelling influence on that community. Approximately 20% of the jobs in the area are generated by Kodak, and the date of Kodak’s annual bonus disbursal is always an occasion for celebration by local merchants. In addition,

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1In addition he loaned other executives money to buy Kodak stock, and made sizable donations to outside organizations.

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financial support from Kodak comprises an important component of the budget of many area educational, artistic, and charitable organizations.

The paternalism that characterizes Kodak was and to some extent still is accompanied by a high degree of centralization of power. Prior to a major reorganization in 1985, corporate management was a tight-knit powerful group with a daunting corporate bureaucracy at the State Street headquarters. Prices were set centrally, and decisions, even for minor expenses, were often made at the top [Fortune 1986]. The 1985 reorganization began to shift the foci of power to the business unit heads, a trend that continues with the ongoing decentralization of finance and accounting functions.

Another important aspect of the Kodak corporate culture is its propensity towards a high degree of vertical integration in production linked with a centralization of power at the very top. For many decades, whatever Kodak sold Kodak made. Besides buying virtually all its chemicals from the Eastman Chemical Division subsidiary, Kodak owned the powerplant that generated its power in Rochester, and even owned stockyards, Kodak cows assuring it a high quality source of gelatin for its photographic needs [Subak 1987A].
2.2.2 Job Security

The notion of Father Kodak is closely tied to the longstanding assumption that a job at Kodak was a job for life. The company's virtual monopoly in photographic markets led to high profitability and an ability to provide employment security and above average wages and benefits to employees. Until the early 1980's a job at Kodak was, in fact, a job for life.

Coupled with this is a tradition of promoting almost exclusively from within. Managers are distinguished by their long tenure with the company and outsiders in management are a rarity. In the past thirty years only one member of the top management team was brought in from the outside, a former general counsel. Upon retirement, he was replaced with a Kodak veteran of 29 years [Journal 1987].

2.2.3 Economic Basis for Culture

While many of the aspects of the Kodak culture were influenced by George Eastman's initiatives, it is the underlying economic factors of Kodak that allowed and encouraged its evolution to the present state. Principal among these factors is Kodak's possession of a monopoly in the sensitized goods business that for many years was virtually unchallenged. The growth, profit margins, and apparent relative insensitivity of sales to price in this business resulted for many years in extremely high positive cash flows that afforded Eastman Kodak high flexibility in its handling of
internal affairs. Given reasonably efficient mass production of sensitized goods, other internal costs, such as compensation and benefits of its employees, were, by comparison, small. If profits at any time, appeared unnaturally low, the solution according to Kodak lore was simply to raise prices.

A second factor was the nature of its primary products. Economies of scale and predictable, stable, demand encourage a high degree of vertical integration in production of film and, to a lesser extent, in the manufacture of cameras. Also, because the company's product line focus was relatively sharp and because the company, although active internationally, pursued a uniform pricing policy across its international photographic operations [Subak 1987B], centralized management was effective for a long period of time.

2.3 Competition in Film and Imaging

The second half of the 20th century is characterized by increasing competitive challenges to Kodak in the film and imaging businesses². Four subjects of particular interest are the

²This is not to imply that there was no competition in earlier periods. In fact, between 1895 and 1907 Eastman Kodak acquired 22 American photographic manufacturers in part to eliminate competition [Alt 1986E]. It seems clear, however, that for the first half of the century or so Kodak's lead over the competition was so great that challenges to its virtual monopoly were limited to isolated countries and local and niche markets.
• gradual erosion of Eastman Kodak's near monopoly in the sensitized goods business that has put downward pressure on its bottom line results,
• changing strategic role of the Kodak camera vis a vis Kodak film,
• consequences of the rise of non-camera equipment sales, and
• threats and opportunities of electronic imaging

These topics are discussed in the following four sections.

2.3.1 Loosening of the Kodak Stranglehold on Sensitized Goods

A 1954 U.S. Justice Department consent decree that forced Kodak to sell its film and processing separately was the first significant event of the past half century. This decree broke Kodak's lock on the processing market and enabled the entry of competitors. The most formidable of these competitors was to be Fuji Photo Film Co., a company that after less than five decades in the industry ranks second today only to Kodak [Alt 1986D].

In the 1960s, Fuji, building on its sales base in Japan, entered the US market using a low price, high quality strategy [Subak 1987B]. It attacked both the industrial and consumer markets gaining 12% US market share of conventional amateur film sales by 1988 [Nelson 1989]. While Kodak was able to maintain its US market share at 81% and world wide share at 51% (cf. 28% Fuji), the competition by Fuji and others in film and paper
limited its ability to set prices. This, together with an overall decrease in the rate of growth of photographic markets caused a decrease in Kodak profit margins and placed serious pressure on corporate earnings.

2.3.2 Rise of 35mm as the Standard Film Format and Decline of the Strategic Role of the Camera

The decline of the strategic role of cameras vis a vis the role of film in the industry and at Eastman Kodak is of particular interest in this report, since in it the roots of many of the issues facing KAD today can be found. For most of the decades of Kodak's existence, film and camera were a system tightly bound by the interlinking of the machinery of the camera with the physical characteristics of the film. Each camera was uniquely suited for the film format for which it was designed, and construction of the camera allowed a cameramaker to dictate film format and get a head start on the film's development and production. Eastman Kodak exploited this arrangement by introducing families of cameras from its first the "Kodak" in 1888 (and subsequently the number two Kodak and the Pocket Kodak), to the Folding Pocket Kodak in 1897, the Brownie in 1900, the Brownie Starmatic in the 1950s, to the family of Instamatics in the 1960s and 70s, the instant camera in 1976, and the disc camera in 1982. Along with each of these cameras came a family of films in roll, cartridge, sheet, or disc form.
While this mode of competition worked well for Kodak until about the late 70s, the ascent of largely Japanese made 35mm single reflex cameras and the associated growth in the 35mm film market changed the competitive dynamics of the marketplace. No longer did design and production of the camera provide an intrinsic advantage in film development and lead time to the manufacturer. Where once the camera was a vital part of a tightly linked camera-film system, it now became a commodity item, easily separable from the film medium that continues to be the economic foundation of the company. The focus of competition in the film business shifted almost entirely to the development, production, distribution, and marketing of film.

Although Eastman Kodak was and is the leader in 35 mm film, manufacture of cameras in this format gives it no proprietary advantages. Moreover, since its focus in camera manufacturing traditionally was on low end cameras for mass markets, Kodak did not elect to compete in the manufacture of 35 mm SLRs, traditionally high end products. With phase out of the disc camera program in the mid 1980s, Kodak significantly downsized the design and production of cameras, causing serious problems for its camera manufacturing facilities at KAD.

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3In 1975 one photo in ten was made in 35 mm format, in 1987 that figure was two out of three. In that year, nearly half of US film sales by volume and three fourths by value was composed of 35 mm film [Economist 1988].
2.3.3 Electronic Imaging: Threat and Opportunity

The rise of electronic imaging in the second half of the 1980s presents a serious threat to Eastman Kodak. Electronic imaging is the digital capture of images and storage on magnetic or optical medium. The technology allows straightforward image manipulation without loss of fidelity and thus promises superior image resolution. At present it is limited by poor image resolution compared to that offered by 35mm film and high price. However, these discrepancies are likely to be eliminated by the early 1990s, at which point electronic imaging is likely to become the technology of choice for image capture in many markets, and may eventually result in the obsolescence of conventional film and cameras.

While these developments are likely to represent the major competitive threat to Eastman Kodak in the remainder of the twentieth century, Kodak's response may present substantial opportunities for KAD, since it is unlikely that Kodak will abdicate the core photography/imaging businesses to which its profits, brand name, and distribution strengths are closely tied. At least two routes of entry are available. Kodak may choose to enter the electronic imaging devices (eg. electronic cameras) markets. This is unlikely since this business is heavily based on miniaturization of electronic components - consumer electronics knowhow that is in short supply at Kodak (and indeed in the US). More likely is Kodak's continued and increased involvement in producing printers of all sorts, specifically mechanisms for transfer of digitized images from magnetic/optical
medium to paper. In either case much of the value added in these products is hardware based and KAD may be able to profit from this.

2.4 The New Kodak: 1985 to Present

2.4.1 The Corporate Restructuring of 1985: Birth of the LoB

The corporate structure and culture of Kodak served it well for many decades. Throughout the 60's and most of the 70's earnings were superior and the company was successful in keeping unions out, and in retaining a high quality workforce, whose productivity, personnel turnover, and absenteeism compare favorably with that of other large companies [Paul 84]. However, pressures on corporate earnings in the 1980s and widely held perceptions of Kodak complacency in the face of intensified competition led to much internal “soul searching” and analysis.

A part this self examination was Kodak's retention of the management consulting firm McKinsey and Co. and the subsequent reorganization, in 1985, of the Photographic Division, the largest of four operating divisions. According to Kodak CEO Colby Chandler, the reorganization had four primary objectives [Chandler 1986].

1. Unite product development, marketing, and manufacturing in business units, so that these sections act like companies within companies.
2. Encourage decisionmaking at lower levels.
3. Increase the company's knowledge of the marketplace and improve its service to customers.
4. Retain the benefits of functional integration where it contributes to the company's competitive position.

The restructuring created a new Photographic and Information Management Division with seventeen Lines of Business in equipment and sensitized goods. Each LoB was given full product responsibility and authority including control of design and development, sourcing, assembly, and marketing functions [Zaffino 1989]. The different businesses were placed into one of three organizations, Commercial and Information Systems, Diversified Technologies, and Photographic Products, primarily on the basis of commonality of product offered, markets served, or technology used.

A schematic of the reorganization as it affected equipment development, manufacturing, and support services at the KAD site is given in Figure 2.2. The old organizational structure was characterized by a high degree of functional specialization with control of the various business functions residing at the very top of the organization - the KAD (site) general manager. The new organization integrated product development, product assembly, marketing, and sales, in a number of new Lines of Business. Before and after the reorganization, most of these functions were collocated at the KAD site.
While the 1985 restructuring involved both film and equipment producing businesses, its effect on the latter, most of which were located at the KAD site, is of particular interest. Figure 2.3 shows a schematic of organization in product development and manufacturing areas before and after reorganization. The area of each segment indicates relative volume of activity. Various product development activities were placed at the core of the LoBs. However, activities one stage lower in the value chain, such as parts fabrication, electronic board assembly, etc., were not broken up by
Line of Business\textsuperscript{4}. Instead, the fabrication groups heretofore informally referred to as Core Manufacturing, were placed as a group in a separate organization\textsuperscript{5}.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{LoB} & 1 \\
\hline
T,773 & LoB 2 \\
\hline
- & LoB 3 \\
\hline
- & LoB 4 \\
\hline
+ & Core Manufacturing \\
\hline
\end{tabular}
\caption{Effect of Restructuring on Equipment Manufacturing}
\end{table}

A second pertinent feature of the restructuring was its treatment of support activities. Prior to 1985, support functions such as accounting, site management, materials management, and industrial engineering were organized on a site-wide basis, similar to the treatment of core

\textsuperscript{4}It is not clear why this was the case. Retention of functional integration (see Section 2.4) due to economies of scale is one possible explanation. Other reasons for this outcome given by various Kodak personnel include efforts of a powerful executive to maintain control, LoB non-interest in managing and owning fabrication departments, and difficulty of division.

\textsuperscript{5}In fact, some product development capabilities that were traditionally housed in core manufacturing groups such as the design capability for optical assemblies were also not integrated into the LoBs.
manufacturing. In 1985, this set of activities - core services, if you will - was combined with the core manufacturing activities into one organization with one general manager, taking the name of the site, KAD.

2.4.2 Eastman Kodak in Mid-1989

Eastman Kodak in 1989 is still the world leader in the photography business with 50-55% of the amateur print film share globally; and, photography is still its core business with margins that exceed most others. However, Kodak is also a major player in equipment businesses, the chemicals business, with the Eastman Chemicals Division originally formed to supply Kodak with chemicals for sensitized goods but now a major business in its own right, and the drug business, with the recent acquisition of Sterling Drugs. Sales by sector in fiscal year 1988 are given in Table 2.1.

Table 2.1: Eastman Kodak Fiscal Year 1988 Revenue & Earnings

<table>
<thead>
<tr>
<th>Sector</th>
<th>Revenue (M$)</th>
<th>Earnings (M$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imaging</td>
<td>6,640</td>
<td>1,280</td>
</tr>
<tr>
<td>Information Systems</td>
<td>3,940</td>
<td>380</td>
</tr>
<tr>
<td>Health</td>
<td>3,690</td>
<td>650</td>
</tr>
<tr>
<td>Chemicals</td>
<td>3,030</td>
<td>630</td>
</tr>
<tr>
<td>Total</td>
<td>17,300</td>
<td>2,940</td>
</tr>
</tbody>
</table>

Ch. 2: Eastman Kodak Company
Imaging includes photographic products and part of what used to be in the diversified life sciences group. Sales of color film and paper accounted for about 48% of this division's sales and 85% of its operating profit [Landry 1989]. Information systems include the Copy Products unit ($1.4B), Graphic Imaging Systems ($1B), Business Information Systems ($800M), Mass Memory devices ($250M), and Federal Systems ($200M). Health and chemicals are primarily the Sterling Drugs division and Eastman Chemicals division, respectively.

Equipment has become an increasingly large part of company sales buoyed by the success of the company's copiers, microfilm devices, and clinical analysis equipment. Camera sales, on the other hand, are now only a small fraction of total sales and Kodak marketshare even at the low end of the market is minimal. Moreover, all of the cameras that Kodak does market, with the exception of the low end single use “Fling”, “Stretch”, and “Weekender” models, are manufactured by original equipment manufacturers in the Far East.

Eastman Kodak in 1989 is also a company in transition. Intensified competition and the resulting pressures on the bottom line in the past decade have created turmoil within the company. Restructuring has become almost an ongoing activity. And, “work force reductions” and "reductions in force" begun in 1983 have become commonplace.
Although much of the labor reduction has been through voluntary early retirement plans, it has taken its toll on employee morale. The hire from within policy has been softened and Kodak has recently entered into several innovative agreements to use outside vendors to supply it with communications and information management needs.

1989 brought yet another reorganization. In addition to rearranging some LoBs and merging others, this reorganization realigned KAD with the part of organization that includes its biggest customer, and assigned Kodak AG (KAG), a design and engineering facility in Stuttgart, Germany that provides design and manufacturing capabilities primarily to Copy Products, reporting responsibility to KAD's general manager, Zaffino.
Kodak Apparatus Division

Chapter 3

To understand the issues, problems, and opportunities facing KAD today it is necessary to examine its evolution from the Cameraworks established by George Eastman in downtown Rochester to the 4.5 million square feet facility that is today's Apparatus Division, the home of several camera and equipment businesses, and KAD's changing role within Eastman Kodak. This chapter gives a brief description of the Kodak Apparatus Division.

Before commencing with the description the several meanings of "KAD" should be defined. First, Kodak Apparatus Division is the title given to the facilities located on some 600 acres at 901 Elmgrove Road in Rochester. Second, prior to 1985, KAD was the name of the the entire Kodak organization located at the site. This second definition of KAD became defunct in 1985 with the reorganization of site activities into some 17 LoBs and into the core manufacturing and services organizations that comprise the KAD (third meaning) of mid-1989. The latter, an organization of approximately 5000 people (cf. 12000 on site) is the primary subject of this thesis and the object of the description below.
Unless otherwise noted, KAD from here on refers to KAD the core manufacturing and services organization.

Describing KAD is a difficult task. It is a tremendously large and diverse collection of organizations, people, equipment - systems and assets of all kinds. However, a good description is crucial to the analysis (it is in fact a part of it) and must be attempted. The next several pages discuss in turn the mission, people, products, customers. The description is divided into three parts. First KAD’s history and two major factors in its evolution, the decline of KAD camera manufacturing and the rise of (non-camera) equipment manufacturing, are described. These events took root prior to the 1980s, however, much of their effect was not felt until the 1980s. Second, KAD in the 80’s was characterized by two major events, the failure of the disc camera and the 1985 corporate restructuring. An examination of these events is given in Section 3.2. Finally, Section 3.3 focuses on the KAD of today by examining its people, products, customers, organizational structure, and its strategic position within the Eastman Kodak Company.

3.1 From Camera Works to Apparatus Division

Most of Kodak's equipment manufacturing of today is an outgrowth of its long history of camera manufacturing that dates back to George Eastman and the company's Camera Works facility then located at the company's downtown Rochester headquarters. The begin of a modern
KAD is marked by relocation of the Camera Works plant to a new 4.5 million square feet manufacturing site beginning in 1969, one of the largest contiguous facilities in the United States, a few miles west of corporate headquarters.

This section discusses KAD’s original (camera manufacturing) mission, the decline of camera manufacturing, and the rise of non-camera equipment manufacturing.

3.1.1 The Original KAD Mission: Camera Manufacturing

KAD’s traditional mission in the Eastman Kodak Company was the design and manufacture of cameras. Before the popularization in the 80’s of the 35 mm format as a standard for photography, camera and film had a unique interface thus locking in the buyer of the camera to a particular film format. Much like in the razor/razor blade relationship, where the razor is used to lock in customers for the disposable blades, camera sales (at low margins) locked in customers for high margin film sales and processing.

Although other film manufacturers could and did copy the format and introduced competitive film products, the time required of competitors to introduce film in the appropriate format gave those film manufacturers who also produced cameras a substantial competitive edge in their sales of film. KAD, as developer and large scale producer of
cameras to be used with Kodak film, played a key role in this competition.

3.1.2 Decline of KAD Camera Manufacturing

This strategy recipe was followed for several generations of cameras, from the Brownie camera in the early years of the century, the Brownie Starmatic cameras with 127 format film in 1957, to the Instamatic family of cameras with 120 format film introduced in 1963, the 110 Pocket Instamatic camera in 1972, Kodak's own instant camera in 1976, and the disc camera in 1982. Each of these cameras was a low-end product aimed at the mass market that could provide the sales volumes Kodak sought\(^1\), and each was matched with a unique companion film format. It was with a specially designed film cartridge for the Instamatic, with Kodacolor II in 110 format for the Pocket Instamatic, instant film for the instant cameras, and flat disc film for the disc camera. Until the late seventies Kodak was the dominant producer in the camera business possessing greater than 50% market share in 1968 [Forbes 1968].

The disc camera marked the end of an era of introduction of proprietary formats and virtually the end of camera manufacturing at KAD. After prospering in the 1960s and 70s with the family of Instamatic cameras

\(^1\)Kodak also manufactured a limited number of high end models (eg. the Kodak Retina) almost exclusively at its West German KAG facility. However, the sales volumes of these cameras were relatively small and they will not be the subject of further discussion.
and cartridge film, Kodak had expected to switch its customers to slender pocket sized disc cameras using specially designed discs of film instead of rolls [Economist 1988]. While the disc camera was well received initially with over 8 million sold in 1982 (three times the sales of the Instamatic in its introductory year, and double the sales of pocket cameras in 1972), this sales figure was well below company internal first-year projections of 11 million units, and the disc camera never established anything approaching the market dominance projected by Kodak. It accounted for merely 3% of camera sales in the US in 1987, compared with approximately 50% for 35mm cameras [Economist 1988]. Production was discontinued in 1988.

The changes in the competitive nature of the camera business in the late 1970s and early 1980s that caused the collapse of the disc camera program are also at the core of the fundamental changes in KAD's mission. While Kodak was developing the disc camera, the Japanese simplified 35 mm single lens reflex (SLR) cameras and developed easy-to-use features that allowed it to expand from its traditional professional market deep into the amateur market. (Economist, July 30, 1988). This increased simplicity and functionality coupled with the superior image quality of 35 mm exposures resulted in the emergence of the 35 mm format as the standard format for photography. Development and manufacture of cameras now lent no inherent advantages to Kodak's film sales².

²There may be some correlation between ownership of a Kodak camera and likelihood to buy Kodak (as opposed to some other brand) film for that camera. However this link is
In addition to losing the strategic link inherent in the coupling of film format and camera, Kodak completely missed the trend to this new vehicle for film consumption. Although Kodak has introduced several 35 mm SLRs after 1982, these were manufactured by Chinon and Haking in Japan and did not gain large market shares. By 1985, the Kodak camera business had lost its position as preeminent camera manufacturer and largest KAD based business. Only a family of disposable camera products, the first of which was introduced in 1988, is currently manufactured at KAD. This family of cameras is a low value added product and represents a relatively small dollar volume of production.

3.1.3 Growth of the Kodak Equipment Business

Due to its rapid growth in the late 1970s and throughout the 1980s, Kodak equipment began to play a major role in KAD manufacturing in the '80s soon rivaling that of camera manufacturing. The Kodak copier business is the leading example of this. In the span of a decade this business has become the largest manufacturing organization at KAD, surpassing camera manufacturing. In this case, although the original link of this business was to film/chemistry (the Verifax), the present day technological synergy is with the optics of the camera, more generally, Kodak's strength in imaging systems.

likely to be weak, and it does not imply any necessity for internal development and production of that camera.
The shift of KAD from camera manufacturing to equipment manufacturing has had major implications to its people and manufacturing facilities due to fundamental differences between the camera and equipment businesses:

- The new equipment is relatively high cost and high value added.
- To the extent that the new equipment does not utilize film or chemistry-based disposables, it has little strategic tie-in to Kodak's traditional business.
- Equipment manufacturing processes are characterized by low volume batch production of a large number of complex components that require expertise in a diverse set of processes and technologies, unlike high volume, repetitive, relatively low complexity camera production.
- Equipment is characterized by a high electronics content unlike the mechanical/assembly nature of still cameras.
- Product life cycles are less well known and likely to be shorter and more volatile than those of still cameras in the mid-twentieth century.
- Kodak has a relatively small share in most of the equipment businesses in which it competes and competition is vigorous.
- Equipment service has come to be a major factor.
A key effect of this change in the nature of the business is a new emphasis on cost effective production. Because of its high value and, in many cases, lack of strategic link to the core film business, much of this equipment had to be sold on its own merits. A second result of these changes is an increased difficulty of vertical integration of production. While this was desirable and feasible for high volume camera production it is much more difficult and costly to achieve in low volume production of complex equipment. The resulting cost performance pressure presented major challenges to Kodak equipment manufacturing organizations.

3.2 The Decade of the '80s

This section examines KAD in the decade of the '80s, probably its most volatile period in the 20th century. The decade is marked by three major events, the decline of Kodak camera manufacturing culminating in the failure of the disc camera program, the Kodak corporate restructuring in 1985 that fundamentally altered the relationships between fabrication and product development and assembly units, and the KAD internal and restructuring that followed the Kodak restructuring. These events will shape KAD's evolution for some time to come and are discussed in turn.
3.2.1 Effects of the Decline of Camera Manufacturing

The instant camera program was the first of two camera programs whose failure left deep scars on Kodak and on KAD. In the late '60s Kodak embarked on development of instant photography after it became clear that this market, then dominated by Polaroid, would be a sizable one. Immediately subsequent to introduction of Kodak’s first instant model, in 1976, Polaroid sued and, in 1986, Kodak was ordered out of the instant photography business for violating several Polaroid patents. Subsequent (and, in June 1990, ongoing) hearings were announced to argue the amount of damages to be paid by Kodak to Polaroid.

The instant camera fiasco affected KAD in two ways, directly through its impact on KAD people and facilities involved in production the product, and indirectly through the deterioration of the Kodak bottom line which resulted in increased cost performance pressure on all parts of the Eastman Kodak Company. A week after the 1986 judgement Kodak dismissed 500 KAD workers [Fortune 1986]. The total impact on the Kodak bottom line will likely be large. Although in May 1990 the amount of damages had not been announced, securities analysts’ estimate are between $1-2 billion. This is in addition to Kodak costs in 1986 estimated at $800 million for closing its instant photography

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3Kodak actually passed up instant photography when in the 1940s Edwin Land offered it rights to his process.
operations and carrying out an exchange program for owners of the camera.

The failure of the disc camera program was the second major event that had severe repercussions at KAD. In order to meet the projected production requirement of 11M units in the year of introduction KAD added numerous workers and large increments of fabrication capacity. The effect of the failure of the program on KAD employees was particularly onerous. In January 1983, 1100 mostly temporary employees working on the disc camera were laid off. Four months later in May an additional 1600 workers, both temporary and permanent employees were laid off. The program's demise affected not only KAD. Kodak-wide 5000 jobs were eliminated through a special early retirement program in 1984; in addition, approximately 2000 summer jobs typically taken by college students were eliminated and a year long company wide wage freeze was instituted [Paul 1984].

Figure 3.1 shows KAD employment trends during that time period.
In the nine year period from 1979 to 1987 the population at KAD core grew from just over 7000 to greater than 11000 in 1982 and then decreased to less than 7000 in 1987. Most of the decline in employment between 1981 and 1982 was due to the reduction of the disc camera production schedules. Although temporary workers bore the brunt of the early labor reductions, large numbers of regular employees were also laid off. These large scale layoffs marked the end of what had been considered a de facto Kodak corporate lifetime job policy. They disproportionally affected hourly shop floor personnel as shown by a deterioration of the hourly to non-hourly ratio by nearly a factor of two in that time (see Figure 3.2).
The second large downsizing was in part a result of the corporate restructuring that commenced in 1985 (see Section 2.4).

3.2.2 Effects of the 1985 Restructuring: The New KAD

The goal of the 1985 corporate restructuring (see also Chapter 2) was to focus Kodak units by product line or market. It created some 17 business units from what had been a functional organization. The LoBs internalized most of the product development, engineering, and intermediate and final assembly functions, but only a fraction of the fabrication and support activities. The remaining manufacturing and support functions at the KAD site were combined together to form the new KAD.
The new KAD organization included the bulk of the fabrication departments, some product development activities, particularly in optics, as well as site support services such as accounting, maintenance, security, and materials procurement. Thus, KAD played several roles to the on-site equipment manufacturing LoBs. It continued to provide routine site services such as security and housekeeping. It provided on-demand planning and industrial engineering services as well as some engineering and design support. And finally, and this was perceived as its primary objective, it provided fabricated parts and components at cost to LoBs engaged in equipment manufacturing.

The impact of the reorganization was primarily due to the change in relationship between manufacturing and the product development and assembly organizations, rather than to changes in functions of any particular unit. In fact, prior to 1985, both site support and core manufacturing existed as separate cost centers and were shared by product development organizations, and make/buy analyses for equipment components were routinely performed. However, unlike pre-1985, no control structure (in the form of a general manager overseeing all KAD site activities) existed post 1985 to ensure utilization of production facilities.

Whereas previously management could (and would) override buy decisions to maintain production volume in KAD facilities as it thought appropriate, LoBs had little inherent motive to do so. They now had
specific financial goals based on the performance of their sales and cost figures, and were connected to shared manufacturing only by the requirement that they show appropriate returns on that percentage of KAD core assets their purchases from core represented⁴. Although some LoBs maintained their volume of purchases from KAD, others, citing non-competitive internal cost, quality, and delivery performance, removed portions of business from KAD. This reduction of business produced serious problems - bordering on crisis - for core manufacturing, KAD's response to which is discussed in the next section.

3.2.3 KAD Responses to the Crisis in Manufacturing

Before examining KAD's responses to its competitive situation, it is important to note that the various organizations within KAD were affected differently by the changes in the competitive environment. The hardest hit seem to have been the organizations associated with manufacture of mechanical parts and subassemblies who lost significant amounts of business, while organizations involved with electronic products have been successful in retaining market shares of up to 90% and higher of LoB business.

⁴RoA responsibility for a cost center must ultimately be born (implicitly or explicitly) by some profit center. In KAD's case it is transferred to the (LoB) profit centers roughly in proportion of their percentage of total value added by KAD. In effect this constitutes a margin on goods, that is similar to profit margins on outside purchases. In order to make an economically fair comparison with outside purchases a LoB must impute a RoA margin on all internal bids.
One of KAD's responses to the crisis was to form a "Mess Team" of 17 KAD employees charged with coming to an understanding of the "nature, scope, and relationships between the problems facing KAD" [Mess 1986]. This team identified three major reasons for KAD's condition:

1. The management style was militaristic, focused on control rather than planning, detail oriented, and indicative of a distrust of KAD people and a loss of touch with KAD customers.
2. KAD lacked a plan to identify and focus current and future businesses.
3. Large an unresponsive systems that are unwieldy, self-propagating, and do not return metrics suitable for measuring performance.

The Mess Team used an "idealized design" process facilitated by an outside consultant to create a conceptual organization that "management would like right now if current facilities 'burned down"' [Zaffino 1989]. The team's recommendation appear to be a primary factor in KAD management acceptance of several key principles including

- profit center mentality
- employee involvement and participative management
- "interactive" planning
- customer orientation
- minimal organization levels
- decentralized systems
It is difficult to evaluate exactly the success of the implementation of these principles and of other ongoing activities. However, some product related metrics do indicate significant improvement in KAD's performance. Figure 3.3 gives the delivery performance (five days early, zero days late) period-by-period of the KAD organization between the eight period of 1986 and the third period of 1989\(^5\). Substantial improvement is evident. From a low of approximately 10% on-time delivery, the performance increased to over 90% by 1989.

Figure 3.3: KAD Delivery Performance Improvement

In addition, KAD management was successful in reducing the number of levels of management, and, it appears, in achieving significant gains in

\(^5\)At the time of measurement Kodak used a 13 period annual calender.
product quality. For example, one organization, Advanced Sheet Metal Manufacturing, reports several milestones that are indicative of improvements in quality [Goodwin 1990]:

- 6/86: defects measured in rejects vs. % good
- 1/87: 20,500 PPM (parts per million)
- 2/88: 22,500 PPM (following reduction in force)
- 7/89: 800 PPM
- 12/89: "Silver Award" for quality awarded by Copy Products LoB

Another attempt to adapt to the new environment was an effort to achieve significant sales outside of Eastman Kodak. The primary goals of this venture appear to have been utilization of idle capacity as a buffer against variations in LoB purchase volume and competitive benchmarking. In one of the rare managerial outside hirings, a non-Kodak marketing executive was recruited for this purpose. This attempt was unsuccessful although its first year sales target was easily satisfied. Reasons for the failure are not clear. After 2-3 years of trial the outside sales effort was formally discontinued (a small volume of outside sales remain) and the executive in charge left the Eastman Kodak Company.

Despite these efforts, it is clear that KAD as an organization continues to face serious problems and questions about its viability. The continued downsizing of KAD is an indication of this. Figure 3.4 gives the history of KAD employment from the beginning of 1986 to the end of 1987.
In those two years the population of KAD has decreased from almost 9000 people to approximately 5500 people. Although this number has stabilized somewhat since then, employment in mid-1989 being approximately 5200, "reductions in force" continue, and the image of high cost producer is still associated with KAD in the minds of many LoB customers.

3.3 KAD circa 1989

It is useful to step back and take stock of the KAD organization at the end of this period. This analysis will serve as the baseline for discussion of manufacturing strategies in the following chapters. Thus this section describes KAD in mid-1989 by examining its organizational structure, the
structure and functions of its units, its customers, and, finally the competitive challenges it faces and the strategy with which it confronts them.

3.3.1 Organizational Structure

Figure 3.5 gives an organization chart for KAD in mid-1989 along with the approximate number of people in each unit. A general manager who is a Kodak vice president is responsible for the nine major organizational units, which range in function from mechanical products manufacturing to site management and in size from 110 to 1300 people.
A distinction between core "manufacturing" and core "services" is drawn in the figure because of the fundamental differences in their functions, in their relationships with other KAD and/or LoB units, and, therefore, in the way they must be managed. Core manufacturing is defined here as...
that set of KAD activities involved directly in the production of physical products, while core services are functions or services provided by KAD to all site LoBs (and to itself)\textsuperscript{6}. In addition two units, Technical Center and Planning & Industrial Engineering that in effect cut across these two categories and the staff functions of quality assurance and personnel relations are shown\textsuperscript{7}. Approximately 60\% of KAD people are in core manufacturing, 40\% in core services.

3.3.2 Core Manufacturing Units

The 3000-odd employees in core manufacturing are involved in a wide range of product-related activities ranging from production of mechanical, optical and electronic parts and products to the development and manufacture of low volume and even single items of complete pieces of equipment. A description of each core manufacturing unit is given in Table 3.1. Typical organizational structure at the departmental level is described in Section 3.3.3 below.

\textsuperscript{6}These definitions are necessarily "soft" - the boundary between "manufacturing" and "service" functions is not a rigid one.

\textsuperscript{7}The Planning section of IE/Planning might also be considered a staff function to KAD (see description in Table 3.1).
Table 3.1: Description of Core Manufacturing Units

<table>
<thead>
<tr>
<th><strong>Mechanical Products</strong></th>
<th>Fabrication of sheet metal parts, rotational parts, stampings, etc. Organic and inorganic finishing. Integrated CAD/CAM/CIM for plastic molding. Welding.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electronic Products</strong></td>
<td>Design and fabrication of application specific integrated circuits, hybrids, printed wiring boards, cable &amp; harness assemblies (on and off-site), surface mounted and through hole circuit board assemblies, thin film hybrid assembly, finished product assembly.</td>
</tr>
<tr>
<td><strong>Product Development and Manufacturing</strong></td>
<td>Design and fabrication of product prototypes and engineering models, testing equipment for new products. Low volume and customized products.</td>
</tr>
<tr>
<td><strong>Optical Products</strong></td>
<td>Design, engineering, analysis and fabrication of optical and electro-optical assemblies. Process development and engineering, optical metrology. Molding of spherical and aspheric glass lenses. Fabrication of commercial grade optics (in Taiwan).</td>
</tr>
<tr>
<td><strong>Technical Center</strong></td>
<td>Technical resources and consulting services for product and process technology development and engineering. Analytical product testing. CAD/CAM and compound semiconductor development.</td>
</tr>
<tr>
<td><strong>Planning and Industrial Engineering</strong></td>
<td>Industrial engineering provides consulting services in design, engineering, and manufacturing, with focus on analytical problem solving and improvement of organizational performance. Planning provides strategic and operational planning support primarily to KAD.</td>
</tr>
</tbody>
</table>

*Source: Orientation package for new KAD employees, 1989.*
The Technical Center and Planning and Industrial Engineering are included in the table because some of their support and development functions are utilized by the four manufacturing units. In addition, these two units provide their services to LoB customers on a contractual basis. Optical Products is also somewhat different from the other manufacturing units in that it has traditionally contained, in addition to the fabrication resources, the company's optical design expertise, design people that can be contracted to LoBs.

The diversity of the manufacturing units is large, with the manufacturing processes differing widely in their use of technology, level of sophistication, amount of value added they provide, and perceived benefit to and by the customer. In addition, the units differ in their extent of market penetration and the degree of perceived customer orientation. The main commonalities are the use of facilities and the customer base.

Structure of KAD Manufacturing Units

Obtaining an understanding of the organizational structure along a "vertical slice" of KAD is important to developing an understanding of the entire organization. Figure 3.6 describes the structure of one particular department - Advanced Sheet Metal Manufacturing - a part of
the Mechanical Products Unit. Although the structure of each unit and in every department is unique some characteristics are generic.

Figure 3.6: Organizational Structures at Unit & Department Levels
While many of the business and technical support functions are placed under department control in this case, it is interesting to note that the internal marketing group is constituted as a department reporting directly to the unit head.

3.3.2 Core Service Units

A description of core services organizations is given in Table 3.2.

Table 3.2: Description of Core Service Units

<table>
<thead>
<tr>
<th>Site Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance of sites, grounds, and utilities of KAD site.</td>
</tr>
<tr>
<td>Property and space management incl. safety, security, fire protection, and building services for KAD and all site LoBs.</td>
</tr>
<tr>
<td>Support services incl. maintenance of production equipment, calibration of test equipment, mail service, electrical, heating and ventilation, air, water, sewage, waste disposal, and reproduction services.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comptroller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services provided to KAD, site LoBs, and corporate include inventory and capital accounting, general ledger, burden administration, order administration, financial information systems, financial operations/planning, site cost reporting, accounts payable, customer billings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services provided include worldwide procurement, quality assurance, and material control for finished goods, parts and raw materials.</td>
</tr>
</tbody>
</table>

Each of these units performs support functions on a contractual basis for all on-site LoBs as well as for KAD. Hereafter, the focus in this thesis will be on core manufacturing, to the extent that this can be considered independently of the core service organizations. Core services will again be considered in Chapter 8.

3.3.4 KAD Customers

LoB customers because of their permanency and influence on KAD play an especially important role. Because of a restriction on KAD external sales by corporate management, its customer base is primarily Kodak businesses. Over 90% of KAD sales are to the eleven LoB customers\(^8\) shown in Table 3.3 below.

---

\(^8\)A small percentage of sales is to outside customers. This is primarily due to commitments made during the short lived external sales program mentioned earlier.
Table 3.3: Kodak Equipment Selling Lines of Business

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Line of Business</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPD</td>
<td>Electronic Photography</td>
<td>Video Printers</td>
</tr>
<tr>
<td>PSD</td>
<td>Photofinishing Systems</td>
<td>Mini-labs, &quot;create-a-print&quot;</td>
</tr>
<tr>
<td>CON</td>
<td>Consumer Photography</td>
<td>Cameras</td>
</tr>
<tr>
<td>PPD</td>
<td>Professional Photography</td>
<td>Film developers/printers</td>
</tr>
<tr>
<td>BIS</td>
<td>Business Imaging Systems</td>
<td>Microfilers, retrieval units</td>
</tr>
<tr>
<td>CPY</td>
<td>Copy Products</td>
<td>Copiers &amp; accessories</td>
</tr>
<tr>
<td>GIS</td>
<td>Graphics Imaging Systems</td>
<td>Film processors</td>
</tr>
<tr>
<td>CL</td>
<td>Clinical Products</td>
<td>Blood Analyzers</td>
</tr>
<tr>
<td>HSD</td>
<td>Health Sciences</td>
<td>X-ray processing equipment</td>
</tr>
<tr>
<td>MM</td>
<td>Mass Memory</td>
<td>Mass memory devices</td>
</tr>
</tbody>
</table>

The chart in Figure 3.7 below shows the distribution of KAD value added, that is the cost of direct labor and burden, by Line of Business. The largest customer by almost a factor of two is Copy Products, followed by Consumer Products and Business Information Systems. As a group these three customers account for approximately 70% of KAD value added. Other large customers are Health Sciences Division and Clinical Products.
It is important to note that these customers are involved in a variety of equipment businesses each with its own set of critical demands that may or may not be cost, quality, or delivery performance. The ability of one manufacturing organization to maintain focus while satisfying the needs of such a diverse customer base is an issue in question (see eg. [URC 1987]).

Another set of data that is of great interest is KAD's marketshare of LoBs equipment manufacturing business. This information would allow estimation of the potential market opportunity for KAD. Unfortunately, this data was not available at the time of this writing. However, KAD and LoB executives suggest that Electronic Products has over 90%
marketshare, as was mentioned earlier, while Mechanical Products appears to service only 10-30% of the market.

3.3.5 "Refocus": The KAD Reorganization of 1989

In 1989 KAD began a major internal restructuring program dubbed "Refocus". The restructuring involves the Mechanical Products, Product Development and Manufacturing, and Technical Center units. It seems to stem from a realization that these units needed somehow to change, to provide more value to their customer, in order to be viable. The objective of the Refocus program is "To help Business Units succeed at Equipment Manufacture" [Zaffino 1989], and, by implication, to help KAD succeed. KAD believes this can be done by adding value to its deliverables and by aligning more closely with its customers.

To achieve higher value addition KAD proposed a four point plan:

- incorporate design and assembly in KAD units
- make multi-discipline subassemblies/products
- integrate technology development with manufacturing
- pursue early involvement with LoBs and design for manufacture

Design of the high levels of the organization was then begun by a steering committee of managers of the involved organizations, followed
by design of the rest of the organization performed interactively by the units involved and members of the steering committee.

The goal of integrating design and assembly with fabrication to allow design and manufacture of multi-discipline subassemblies is being pursued by creation of a "mechanical subsystems" unit that includes some of the design and analysis resources previously located in the Technical Center with some fabrication units. The goal of attaining closer alignment with customers, was begun by seeking feedback and buy-in from LoBs subsequent to the reorganization. The long term strategy here seems to be to define "strategic partnerships" with LoBs that would be characterized by "soft" long term agreements to develop and produce and assemble subsystems for final assembly into LoB products.
Three Equipment Manufacturing Scenarios

Chapter 4

The primary purpose of this report is to identify and evaluate "appropriate" organizational structures for Eastman Kodak equipment manufacturing. This chapter concludes Part I of this thesis by presenting and describing three such candidate structures. The scenarios are focused on the segment of the manufacturing value chain extending from the development to the manufacture of subsystems.

Scenario I: KAD remains captive supplier to Kodak LoB customers exclusively but develops its design, fabrication and assembly capabilities to enable it to provide subassemblies and subsystems, instead of single parts or components. Control of KAD resides in a Board comprised of LoB, KAD, and corporate executives.

Scenario II: KAD becomes a number of autonomous and self-contained companies, with varying degrees of Kodak ownership, depending on the companies' technological status and strategic importance to LoBs.

Scenario III: KAD is broken into discrete manufacturing units by customer or group of customers, and control of each unit is transferred to each LoB customer or group of customers.
For convenience these scenarios are hereafter referred to as Scenario I, II, or III, respectively.

The remainder of this chapter is divided into five parts. First, the rationale for selection of these scenarios is described. Then, each of the three scenario is presented and discussed in turn. Finally, the role of core support organizations, particularly accounting and materials management, is discussed. Evaluation of the three scenarios is undertaken in Part II of this report.

4.1 Selection and Definition of Scenarios

The primary objective for defining several scenarios was to give focus to the organizational assessment and to provide a conceptual tool for conceptual redesign. Two of the scenarios were chosen because they represent different Kodak-internal views of how equipment manufacturing should be organized: Scenario I was constructed to resemble KAD’s own vision of its future (however, it differs substantially from KAD’s vision in the area of governance), and Scenario III was defined to match the perceived view of at least one senior Kodak executive. Scenario II was chosen because it allows a high degree of flexibility in the structure of manufacturing organizations. As a group these scenarios represent a wide range of organizational alternatives.
The next several sections define the structure of equipment manufacturing in each scenario at a “macro” level. While, in principle, a detailed definition down to department or even machine level might be desirable for analysis, such an examination was not feasible in the framework of this investigation. It also would be inconsistent with KAD’s practice of “idealized design” [Ackoff 1981] in which much of the organizational design and implementation responsibility is placed at the level of the organization that is being redesigned. Instead, an attempt is made to define the key elements of the organization in each scenario and to determine for that element the appropriate structure and relationships.

4.2 Scenario I: KAD as Captive Supplier of Functional Subsystems to LoB Customers.

4.2.1 Mission

In this scenario the mission of KAD manufacturing is to design, manufacture, and assemble functional subsystems, that is modules or subassemblies with clearly defined and testable functions, for integration into LoB products. KAD supports LoB equipment needs primarily by providing them with

1. Key subsystems with a high degree of flexibility (quick turnaround, responsiveness), and with high quality. These "key" systems might be modules that require
extensive design/manufacturing interaction because they require "leading edge" process technology, or build on or are likely to lead to proprietary process/product information that is in and of itself of "high" value.

2. Access to design and manufacturing knowhow (e.g. DFM, DFA) that may help to reduce product cost and time-to-market and to increase product quality.

3. A "repository" of specialized design skills or knowhow (e.g. in optics) that transcend individual LoBs, thus providing economies of scale due to horizontal integration.

4. Equipment that requires EK proprietary process or product information.

5. Quick turnaround on prototype parts and equipment.

6. Production of parts and subsystems not available elsewhere.

7. Parts or subsystems where economies of scale or scope in production lead to "extraordinary" & sustainable (long term) RoA.

8. Viable threat to backward integration (to keep external suppliers in line).

The sum of the activities above might be referred to as "strategic" manufacturing, that is, manufacturing devoted to serving the strategic needs of Eastman Kodak.
4.2.2 Structure of the Organization & Relationships with Customers

In this scenario KAD remains a captive supplier, cost center, and shared manufacturer for LoBs. Its focus is on creating long term “strategic” partnerships with its customers to develop, design, fabricate, and assemble modules and subsystems. KAD provides a “one-stop” shopping service to these customers in the sense of providing integrated design and manufacture as well as make-buy decisions and material procurement at the subsystems level at one point of contact. Partly because information transfer requirements between LoBs and KAD are high and the information itself is necessarily strategic and sensitive in nature, contractual arrangements between LoBs and KAD in this scenario differ from the traditional arms-length relationships in their long term focus and flexibility.

Because its focus is on establishing close relationships with Kodak-internal customers and maximizing the strategic value of such interactions this model does not include an external sales effort by KAD. The level of organizational effort and infrastructure required to support such an effort if it is to be successful is high, and likely to result in some dilution of KAD’s focus on LoB, and, therefore, in KAD’s strategic value to Eastman Kodak1.

1In order to maintain cost/quality competitiveness in the “soft” and long term contract environment of Scenario 1 without engaging in external sales it is crucial that the organization engage in extensive competitive benchmarking with appropriate outside vendors.
The capability for design, fabrication, and assembly of modules and functional subsystems in partnership with LoB customers requires organizational structures tailored to the efficient integration of these functional areas. Figure 4.1 contrasts an existing manufacturing department, dedicated to parts fabrication, with a potential Scenario I department, dedicated to design and production of modules and subsystems.

Figure 4.1: Structures for Traditional and Scenario I Organizations

In the existing structure design and intermediate assembly are separated from fabrication by the LoB/KAD boundary (design may also be separated from intermediate assembly by one or more layers). The activity within manufacturing departments is typically organized by fabrication technology (e.g., punch press versus welding), although some "cell" type integrated approaches exist.
The structure for a Scenario I organization would likely differ from that of the existing organization in the integration of design, fabrication, and intermediate assembly at a department level. Because the design, engineering, and assembly resources currently involved in these activities reside primarily in the LoBs a shift of those resources to KAD, or development of new resources would be required. In Scenario I, the organization within a department would probably be around the subsystem to be produced, with fabrication and assembly functions integrated as required, and design and engineering as a support function within the department².

4.2.3 Governance of a Scenario I KAD

The structure of governance in Scenario I is of critical importance to its success, since it can be crucial to the formation of close links between KAD and its customers. The governance structure that is most conducive to these kinds of relationships is one that is itself such a collaborative relationship between KAD and its customers. This can be achieved by constructing a KAD board of directors consisting (1) of members appointed by the LoB customers in rough proportion to their purchases from KAD, (2) at a minimum, one representative from KAD such as the general manager (but probably each of the four or five manufacturing unit managers as well), and (3) a representative from 

²Note, however, that now subsystem design is separated from system design and integration which resides at the LoB.
corporate headquarters such as a senior vice president\textsuperscript{3}. In addition to enabling close relationships between KAD and its LoB customers this scheme matches authority and control with ownership\textsuperscript{4}.

A possible board make-up is given in Table 4.1. The makeup of this board ensures that interests of all primary stakeholders - the larger EK Company, LoB customers, and KAD - are represented. And, it provides a mechanism for cooperation and coordination among LoBs engaged in equipment manufacturing, especially, but not limited to, the production of KAD parts and subsystems.

\textsuperscript{3}In practice it would be important that this person's role evolve to be primarily facilitative of the deliberations of the board.

\textsuperscript{4}At present the LoBs own all KAD assets since KAD as a cost center transfers return on asset responsibility along with purchased parts to the purchasers - the LoBs. Thus LoBs must each show appropriate returns on that percentage of KAD assets which their purchases represent. However, save canceling their purchase (which would result in at least short term higher burden on the remaining purchases) they have no means of exerting any control over these assets.
Table 4.1: Possible KAD Board Make-up

<table>
<thead>
<tr>
<th>LoBs:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy Products Rep. # 1</td>
<td></td>
</tr>
<tr>
<td>Copy Products Rep. # 2</td>
<td></td>
</tr>
<tr>
<td>Copy Products Rep. # 3</td>
<td></td>
</tr>
<tr>
<td>Health Sciences Rep.</td>
<td></td>
</tr>
<tr>
<td>KAD:</td>
<td></td>
</tr>
<tr>
<td>General Manager</td>
<td></td>
</tr>
<tr>
<td>Unit 1 Manager</td>
<td></td>
</tr>
<tr>
<td>Unit 2 Manager</td>
<td></td>
</tr>
<tr>
<td>Unit 3 Manager</td>
<td></td>
</tr>
<tr>
<td>Unit 4 Manager</td>
<td></td>
</tr>
<tr>
<td>Corporate:</td>
<td>Senior Vice President</td>
</tr>
</tbody>
</table>

In the existing structure, a KAD General Manager reports directly to a senior corporate executive but has no explicit reporting responsibility to LoB customers other than on a contract-by-contract basis. This latter structure is at best neutral to establishment of close ties between KAD and its customers. It does not provide an efficient mechanism for long range KAD capacity and resource planning. Nor does it provide convenient and programmatic means of discussing joint KAD/LoB responses to individual LoB variations in demand for design, fabrication, or assembly services. Instead, it is likely to lead to an artificial separation of KAD and its customers and thus to arms-length relationships that are inappropriate in Scenario I.
4.3 Scenario II: KAD as External Tiered Group of Supplier Companies

This scenario is difficult to describe because, even more so than Scenario I (and Scenario III), it is really a class of scenarios, not one unique scenario. This will become evident in the discussion below. The scenario is described at some length because, of the three, it represents the greatest departure from the current structure.

4.3.1 Premise: Match Ownership and Structure to Strategic Value

This scenario is based on the premise that KAD as it presently exists is a collection of assets, which are of varying strategic importance to Eastman Kodak, and that therefore the ownership and structure of any subset and its relationships to Kodak LoBs should reflect the degree of importance peculiar to it.

4.3.2 Structure

In this scenario, KAD evolves into a hierarchical or tiered group of suppliers, tiers being segmented primarily on the basis of level of sophistication of the process and product technology employed or level of capital investment required (see Figure 4.2). Companies within each tier are typically focused on different products, although multiple sources for the same product may exist/evolve. Ownership of the assets in this scenario varies with level in the structure, with Kodak
ownership decreasing at lower levels. The number of tiers, that is the depth of the supply chain depends on product and process, and a company may be in multiple tiers simultaneously.

Figure 4.2: Tier Concept

![Diagram of Tier Concept]

The conceptual model in Figure 4.2 presents a four-tiered structure. In this case Tier 1 is the set of companies that typically are system integrators on the particular product in question, Tier 2 companies assemble subassemblies for these Tier 1 companies, while Tier 3 companies and Tier 4 companies supply components and components that are commodities, respectively.

A hypothetical tiered structure for a copier is shown in Figure 4.3. The figure shows "tiering" of a supply chain of companies for a particular product "Copier X", possible sales links between companies within the

Ch. 4: Scenarios
structure and between the companies and EK (external sales are not indicated), and degree of EK ownership of the companies.

Figure 4.3: Tiered Structure for EK Copier X

As noted above, first tier suppliers are typically system integrators. They might supply functional subsystems to Kodak LoBs and to other firms, or even design, manufacture, and assemble entire products. Companies in Tier 1 receive lower level subsystems from second tier suppliers who, in turn, receive lower level assemblies from third tier suppliers, and so on.
Companies at the lowest level typically manufacture technologically unsophisticated or labor intensive parts. This structure is similar to the subcontractor structure prevalent in the Japanese automotive and consumer electronics industries (and to some extent in the US automotive industry) [Nishiguchi 1987, 1989].

Note that the “tier” nomenclature is a helpful but artificial construct. Companies occupy a certain tier in supplying some portion of the value added of a particular product but, depending on their capabilities, the competitive environment, and the characteristics of the product, may occupy a higher or lower tier for another product. The depth of the tiered structure, that is, the number of tiers is determined by factors such as the complexity of the product and of the associated process technologies, the size of the industries involved, and the nature of competition in the industries. The number of tiers that exist will vary depending on the product and technology involved. The lowest tier is likely to house "Mom and Pop"-type "garage" operations.

4.3.3 Ownership Structure & Governance

Ownership structure is vitally important to the success of subcontracting in this type of environment. Possibilities in ownership structure include the type of ownership, whether public or private, and, if public, the number of shareholders and the relative size of their holdings. All of these possibilities are exploited in Scenario II since they allow a
considerable variation in the amount of control that may be exerted by Eastman Kodak and other entities on each unit.

In general the level of control over a unit desired increases with the level of strategic importance of that unit to EK. The range of options is described further in Figure 4.4.

Figure 4.4: Typical Ownership Categories

Companies to be held publicly are divided into those that because of their strategic value, and/or level of value added, technology, or high profitability have a high degree of Eastman Kodak ownership, and those that because they are deemed less critical have a correspondingly lesser
degree of Kodak ownership. For example, a 20-40% EK equity share of the former companies might be typical, although some of these might be wholly owned EK subsidiaries. This size share is likely to give Kodak LoBs considerable leverage in determining operating and sales policies of the firm. Units that are deemed to be non-strategic to EK and have a low technology may be placed in private ownership. In this manner, amount of control ranges from complete control via 100% EK ownership of a subsidiary (check nomenclature) to no control via sale of a unit to private ownership.

The governance structure of publicly owned companies in Figure 4.4 would be similar to that of any publicly held corporation. A board of directors would be elected by the shareholders. Eastman Kodak Line of Business representation on that board would be as appropriate for its share. Note that representation and ownership of the shares is at the LoB level, note at the EK corporate level. This is critical for establishment of strong links between the LoB customer and the external supplier^5. In this respect, this governance structure is similar to that of Scenario I^6.

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^5 Interests of a group of LoBs in one company are accommodable in the same framework.

^6 This might be expected, since the functions of the governing boards are similar.
4.3.4 Management in a Scenario II Organization

Appropriate management is a critical factor in Scenario II, which, much more so than Scenarios I and III, represents a departure from the "accepted" modus operandi. Management of units in this scenario must be characterized by its external orientation and a focus on sales and marketing at all levels of each organization. This must be combined with a good understanding of competitive dynamics and, particularly, of the effects of pricing on revenues and costs.

Outside sales and freedom in pricing are just two new dimensions in Scenario II. A third is the removal of a "Father Kodak" (see Section 2.2) from most units of this scenario. This absence of an arguably benovolent corporate parent will require business unit managements to quickly develop multifunctional business skill to support their unit's autonomy. The success of each unit will require a lean customer oriented organization and a management that possesses (or quickly develops) the leadership qualities required to motivate employees and make the tough decisions that will be required to be competitive.

4.4 Scenario III: KAD as Captive Manufacturing Cells Owned by and Integrated into LoBs or Groups of LoBs

In a article on business strategy quoted earlier (See Ch. 2), CEO Chandler stated four objectives for the 1985 Kodak reorganization:
1. Unite product development, marketing, and manufacturing in business units, so that these sections act like companies within the company.
2. Encourage decisionmaking at lower levels.
3. Increase the company's knowledge of the marketplace and improve its service to customers.
4. Retain the benefits of functional integration where it contributes to the company's competitive position.

Scenario III represents fulfillment of the first of the four objectives above, while the present KAD may be thought of as a result of emphasis on objective 4. In this scenario, KAD is broken into manufacturing cells, each with LoB ownership and control. Alignment of cell to LoB is one-to-one, unless two or more LoBs agree to share ownership and control of a manufacturing area. The manufacturing cells would be constructed based on the KAD purchases of each Line of Business. Thus, each cell might contain a wide variety of production capacity, physical assets, and direct and support personnel.

4.4.1 Premise: Create Companies within Companies

The premise of this scenario is that LoB benefits from a high degree of vertical integration and direct control over a large extent of their supply chains outweigh the costs of maintaining such an infrastructure. In particular, benefits might include

• ability to respond rapidly to changes in market demand,
• tight links between design, engineering, and manufacturing, that translate to better design for manufacturing and assembly,

• increased profitability due to low cost fabrication and/or high LoB value added

• increased potential for JIT assembly

• ability to benchmark internally and thus increased buyer power in outsourcing decisions

• protection of proprietary technology

Note that with these benefits the manufacturing "mission" would be similar to that in Scenario I, with less emphasis on Points 3 & 7.

Outside sales of intermediate components and products are not a part of this model, since this lead to dilution of focus and would require a sales and marketing strategy fundamentally different and therefore separate from sales and marketing of the LoBs finished products.

4.5 The Role of Support Services

While the above description of scenarios focused on structure of manufacturing assets, this section gives a brief discussion of the organization of core services in each of the scenarios. Two classes of options are considered: centralization and integration. Centralization is
equivalent to maintaining the existing organization, that is, the particular service remains as a distinct unit, separate from the LoBs and manufacturing organizations. Integration refers to a breakup of the service by unit currently served. For example, in Scenario I industrial engineers currently working on a contractual basis in a given fabrication department would be integrated with that unit.

The discussion below, merely presents options consistent with the scenarios as presented earlier in this chapter. It does not evaluate them. Chapter 8 will examine arguments both for centralization and for decentralization (integration).

4.5.1 Service Functions in Scenario I & III

Each of the service function might be centralized or integrated. In fact the present organizations has a mix of the two with certain organizations (eg. Copy Products) choosing to own rather than contract one or more services (Material Management in this case). The same is true for Scenario III. Most of the LoBs currently purchase these services from KAD and would presumably be willing to continue that practice after integration of core manufacturing.

4.5.2 Service Functions in Scenario II

Any non-Kodak entity is unlikely to purchase services such as accounting, material management, technology development, and
industrial engineering/planning from Kodak, because of the potential for conflicts of interest in those areas and because those activities are likely to be considered possible sources of firm-specific competitive advantage. As such, integration of these services is likely. However, these same entities may well consider the option of purchasing facilities services from a centralized organization, since these are unlikely perceived to be subject to conflicts of interest or sources of competitive (dis)advantage.
PART II

Scenario Evaluation: Four Dimensions

Any attempt at organizational design must submit itself to evaluation and comparison with some baseline standard or a set of company goals and/or directives. Whatever techniques and methods of analysis are employed, the unpredictability of future conditions and a lack of complete knowledge about the current situation necessarily make this is a difficult and inexact process.

Part II of this thesis attempts to perform such an evaluation of the organization scenarios described in Part I. Each scenario is evaluated along four dimensions:

1. *Eastman Kodak return on assets:* how will the scenarios compare in their contribution towards the satisfaction of corporate financial goals.
2. *Timely, cost effective, quality products:* what relative effect will the scenarios have on producing quality products in a timely and cost effective manner.
3. *Quality of work life:* how do scenarios compare on likely effect on the quality of an employee's work environment.
4. *Synergy between units:* in which scenario is the synergy between units likely to be highest.
As a group these dimensions cover a wide range of criteria - financial, product and people related - that will allow a relatively well-balanced evaluation of the scenarios. Also, these four scenarios correspond loosely to the authors perception of corporate metrics for the existing organization and, in particular, are similar to KAD's stated critical success factors given in Figure II.1.

Table II.1: KAD Critical Success Factors [Zaffino 1989]

<table>
<thead>
<tr>
<th>#1</th>
<th>#2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost and Financial Goals</td>
<td>Product and Service Quality</td>
</tr>
<tr>
<td>#4</td>
<td>#3</td>
</tr>
<tr>
<td>KAD Value</td>
<td>Quality of Work Life</td>
</tr>
</tbody>
</table>

The key to the evaluations that follow is that they are ratings of relative "goodness". No attempt is made to quantify the scenarios' attributes on any absolute or cardinal scale. This restrictive evaluation allows early elimination of factors whose effects are unlikely to vary across the scenarios, thereby substantially narrowing the scope of the inquiry.

The following four chapters discuss each of these dimensions in turn. The results of this evaluation are summarized in Part III of this report.
This chapter discusses the relative impact of Scenarios I, II, and III on the first of the proposed dimensions: return on assets (RoA). Two factors, asset utilization and flexibility, are identified as being crucial to EK long-term RoA and as varying across the scenarios. First, the selection of dimensions is discussed. Then, each of these dimensions is examined in turn, and the performance of each scenario is rated with respect to that metric.

A Note on Evaluation of Scenario II

In this discussion, the impact of Scenario II on Kodak RoA is in principle the most difficult to quantify, since ownership of a yet to be defined fraction of assets is retained by Kodak. For the purposes of this analysis it will be assumed that the return on any Scenario II assets is fully appropriated by Kodak. This assumption implies that for any asset that Kodak does not in fact own it has received a market price that fairly reflects the net present value of that asset's future returns.
5.1 Choice of Factors/Metrics

The factors selected for this analysis are the subset of factors affecting RoA that also differ across the scenarios. By definition, RoA is the economic return on the sum of assets employed by an accounting unit over a given period of time. The RoA depends on two factors, the value of the assets in place and the efficiency with which those assets are utilized.

A third factor, flexibility, is pertinent. As defined above, asset value and utilization are static measures. Knowledge of the capacity of each of the scenarios to adapt to changing conditions is also important since this capacity plays a large role in determining long term RoA. Flexibility, when defined as the capability for adaptation and change of the asset base, is such a dimension. This conceptual framework of factors affecting RoA is given in Figure 5.1.

Figure 5.1: Conceptual Framework for RoA Analysis
In addition to affecting RoA a useful dimension must also differ among the scenarios since the relative performance of scenarios is the issue in question. Of the three dimensions above the first does not meet this requirement, since it is assumed that each of the scenarios start with the present set of assets. Thus that dimension can be removed from examination. The remaining two dimensions are examined below.

5.2 Asset Utilization

The major factors in the utilization of human and capital assets seem to be product volume volatility and economies of scale and/or scope\(^1\). This section describes first the effect of volume volatility on asset utilization and then analyzes each of the scenarios by examining the relative level of volume volatility likely to occur and its effect on economies of scale in the three scenarios.

5.2.1 Volume Volatility in Scenarios I - III

Because the present business environment is characterized by a small number of large customers focused on a narrow segment of equipment markets, volume volatility is a serious problem. The 1987 United Research Company study (see Section 1.2.2) of KAD manufacturing units

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\(^1\)Non-physical assets such as "goodwill", patents, or proprietary process or technology information do not seem to be of high relative importance.
compared the use of physical assets by each of these units with norms in their respective industries. In a majority of cases it found that the value of assets in place was high compared to industry averages and that utilization of those assets was significantly lower than industry averages. The primary reason for both of these factors seems to be volume volatility. Because of its impact this phenomenon is described in some detail below.

Effect of Volume Volatility on Asset Utilization

Volume volatility is a root cause of low asset utilization because manufacturing capacity changes in a business environment are often asymmetric with respect to rapid volume changes, particularly if the business is focused on delivery performance\(^2\). This situation is depicted in Figure 5.2. In response to an expected volume increase a capacity addition is made so that delivery performance can be sustained. If, however, the volume increase turns out to be temporary actual capacity reductions frequently lag the sales volume.

\(^2\)The asymmetry may be due to any one of a number of factors, a relative ease of transaction in purchasing an item rather than in its sale, tendency of managers to “hoard” assets, LoB buyer power and KAD reluctance to say no to new production, etc. Delivery performance oriented businesses are especially likely to increase their assets in the face of volume growth projections, thus improving their delivery performance but likely reducing RoA.
Given a tendency towards this kind of behavior, an increase in the fluctuations of the demand for a manufactured product implies an accumulation of unnecessary manufacturing assets and thus a decrease in the efficiency of utilization of the total asset base.

**KAD's History of Volume Fluctuations**

KAD manufacturing has a history of high volume volatility both in the long and short term. Figure 5.3 shows the history of dollars delivered from the KAD site over several years. The data includes value added at the site, purchased parts and materials, and complete products purchased from original equipment manufacturers.
Although some of the overall volume volatility evident here is due to changes in outside purchases, KAD-specific value added shows nearly a 40% decline in volume between 1980 and 1986.

This data in fact understates volatility of that period because it is actual volume delivered, while the operative measure of volatility should be the difference between expected and actual volume, since it is the expected volume that is used by managers to evaluate capacity additions. This discrepancy is especially significant when additions require long lead times. Thus Figure 5.3 does not, for example, capture the full effect of the unrealized volume expectations of the disc camera program.

**Short Term Volume Fluctuations**
In addition to these relatively long term volume fluctuations, short term fluctuations of considerable magnitude are common. Recent production planning data in Table 5.1 provides an interesting case study. The table shows KAD load planning assumptions for 8 major customers for a recent year 3.

Table 5.1: Projected Short Term Volume Changes

<table>
<thead>
<tr>
<th>LoB</th>
<th>% Change in labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Imaging Systems</td>
<td>6</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>13</td>
</tr>
<tr>
<td>Copy Products</td>
<td>31</td>
</tr>
<tr>
<td>Graphic Imaging Systems</td>
<td>3</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>1</td>
</tr>
<tr>
<td>Clinical</td>
<td>8</td>
</tr>
<tr>
<td>Professional Photography</td>
<td>-41</td>
</tr>
<tr>
<td>Other</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

Note the strong (18%) upward change in volume, which prompted capacity additions by a number of KAD departments. In this case, projections turned out to be extremely optimistic. Several of KAD’s larger customers reduced volumes during the year, causing an overall

3 These figures are prepared annually by the KAD planning organization with input from the LoBs, and used in capacity planning. (Note: Individual LoB data has been altered, however the 18% total is accurate.)
drop in volumes and resulting in significant workforce reductions. This is not an atypical scenario.

Volatility in Cameras and Copiers

It is instructive to decompose the volume volatility by product lines. Of particular interest are camera and copier products since they represent the largest production volumes in the past decade.

Figure 5.4, shows the volume of KAD disc camera production in the period from early 1982 to late 1986. It shows significant short and long term fluctuations in volume of output. This program was expected to be by far the largest in terms of dollar value added at KAD at the time.

Figure 5.4 Volume Volatility in Disc Camera Production

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4 Actual data (as is any figure in this report unless otherwise noted). Source: Manufacturing Resource Planning memorandum, April 3, 1987.

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The fluctuations appear to be the result of variations in demand over the product life cycle and of a variety of short term production and sales factors. They are not unique to the consumer camera production.

Figure 5.5 gives data for production of three recent copier models. In the figure the production volumes of each model are superimposed on those of the previous models, that is the lowest curve gives only Model 1 production numbers while the middle curve gives Models $1 + 2$, and the top curve gives production figures for Models $1 + 2 + 3$.

![Volume Fluctuations in Copier Production](image)

Significant fluctuations are again apparent. In this environment, assets inflexibility can cause serious problems for efficient utilization. A short case study helps to illustrate this point.

Ch. 5: Return on Assets
The disc camera (see Figure 5.4) was responsible for the most significant change in volume of manufactured units in the early and mid 1980s. In order to prepare for market introduction and mass production of this item, KAD sharply increased its manufacturing capacity by purchasing equipment and increasing its workforce. While sales of greater than 10 million units yearly were predicted by corporate executives, actual sales fell far short of this goal. As a result of this product failure, KAD was drastically overcapacitated and moved quickly to remove large numbers of employees from its payrolls (see Figure 3.4).

While KAD quickly moved to reduce its workforce, no similar action with respect to physical assets seems to have been successful. Figure 5.6 shows growth of total capital assets\(^5\) at KAD between 1984 and 1989. Some of this growth is due to the introduction of computers and computer related equipment in the mid and late 1980s (unfortunately disaggregated figures were not available to the author at the time of writing). However, another reason may be an inherent difficulty in removing assets. While temporary workers can be dismissed at a moments notice, unless capital assets are written off as losses and discarded, buyers must be found and purchases negotiated for physical

\(^{5}\)Includes regular equipment and machinery and special tooling.
assets. In either case, removal and transportation costs for machinery and equipment are substantial and act as a barrier to reallocation.

Figure 5.6: Asset Growth at KAD 1984-89

![Asset Growth at KAD 1984-89](image)

Scenario Performance and Economies of Scale vis à vis Volume Volatility

Since volatility plays a prime role in determining economies of scale and asset utilization and, therefore, RoA, the capacity of each scenario to adapt to volatile conditions is of critical importance. Given the understanding of the volatility issue developed above, judgement of the relative merits of Scenarios I - III is relatively straightforward.

Scenario I

With the customer base fixed at the present level, no improvement in ability to respond to volume volatility is likely. The costs to Eastman Kodak due to underutilization of human
resources and capital assets are substantial and largely unavoidable.

Scenario II
The customer base is limited only by market forces. Volatility can be inhibited by increasing the number of customers, particularly customers likely to have uncorrelated purchase patterns.

Scenario III
The division of production units by LoB will result in significantly reduced economies of scope and increased volume volatility, particularly in manufacturing units integrated with LoBs that have relatively small equipment manufacturing needs.

5.3 Asset Flexibility

Whereas the previous section considered the capacity of Scenarios I - III to efficiently use existing assets, this section examines the Scenarios' intrinsic capacity to adapt to changing requirements by changing the volume, distribution and application of assets. In light of the observed volume volatility, how quickly and efficiently can the manufacturing facilities in these scenarios adapt to maintain high asset utilization and economies of scale?
The ability to redeploy and reconfigure and the speed of redeployment and reconfiguration of assets can be thought of as being limited by two primary factors, the inherent difficulties in altering the functions of capital assets (e.g., by difficulties in tool and jig changes, equipment relocation, etc.), and, by human nature and organizational culture that generally tend to resist change. Since the three scenarios share an initial asset base the first of the two factors is common and need not be considered further. Human and organizational factors differ widely between the three scenarios and must be examined if a verdict is to be reached. In the present organization, for example, the paternalistic company culture is a strong factor opposing change.

**Scenario I**

The major pertinent difference between Scenario I and the present KAD is its governance structure. The use of customers as directors of a KAD board will help to improve communication between KAD and its LoB customers and between LoBs. To the extent that this will lead to coordination of manufacturing activities this will positively affect the flexibility of the organization.

**Scenario II**

The ability to adopt one of a wide array of organizational alternatives as required by the competitive environment gives this scenario a competitive edge. In addition, because of the scenario's market orientation, non-optimal asset utilization
translates immediately to deterioration of the bottom line and exerts strong pressure for adaptation.

Scenario III

Human factors opposing change in the baseline case are exacerbated by LoB boundaries which further reduce asset transactions. Lack of scale within LoBs will reduce internal flexibility. Thus, shifts in business conditions will have far worse effects.
(2) Timely, Cost Effective, Quality Products

Chapter 6

The previous chapter examined the return on assets implications of each of the three scenarios by focusing on characteristics of the scenarios likely to impact the metrics of financial accounting. Important though those may be, financial metrics do not directly measure factors such as the timeliness of a product introduction, the quality with which the products are imbued, or the ease with which a customer purchases the items, in short, all those factors which collectively go into what we refer to as "customer satisfaction"\(^1\), and which arguably are very important to long term sales and profitability.

This chapter examines the relative impact of each scenario on one aspect of customer satisfaction, the ability to obtain timely, cost-effective, quality products. It is argued that while customer satisfaction is composed of many different factors, the three scenarios have differing impact primarily on this aspect, and that therefore it only merits examination in this report.

\(^1\)These factors are certainly reflected in the long term return on assets or profitability of the company. However, customers occur on a time scale that is inherently longer than that of the quarterly statement or annual report, and the financial metrics lend little predictive capability as far as the nature of a product's impact on customer satisfaction.
6.1 Manufacturing's Impact on Customer Satisfaction

It is posited that Scenarios I - III have the highest impact on customer satisfaction when they affect dimensions of product timeliness, cost, and quality. While these are not the only dimensions of customer satisfaction they are of substantial interest in most Kodak equipment and are influenced by the product development and manufacturing activities that are at the core of Scenarios I - III:

1. The ultimate cost of the product is determined largely early in the development phase.
2. Product quality is determined by its design and by the manufacturing processes employed.
3. And, timeliness of the product introduction is by definition determined by the product development phase.

The next section presents tools that can affect these factors and whose effectiveness may vary across the scenarios.

6.2 Tools for Product Development and Manufacturing

Product development and manufacturing is at the core of most manufacturing businesses. Is our research sufficiently innovative? Are our designers and engineers capable and well equipped? Are our
manufacturing facilities and systems adequate? All these and many more questions focus on the development and production of quality products; and, the success with which an organization answers these has unquestionable impact on customer satisfaction. While virtually every part of a manufacturing organization affects customer satisfaction the activities relevant to the discussion here are those whose impact is likely to differ when operating in the organizational framework of Scenarios I - III. Activities that by their nature are imbedded within each of the organizations so that their impact is unlikely to differ across Scenarios I - III are not of interest.

Table 6.1 gives three sets of activities - concurrent engineering, pushing design down to suppliers, and design for manufacture/assembly (DFM/DFA) - that are felt to meet the requirement of relevance and variation across the scenarios. The primary focus of each of those activities relative to the dimensions is indicated.

Table 6.1: Activities/Dimensions Matrix

<table>
<thead>
<tr>
<th>Activities</th>
<th>Customer Satisfaction Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dev. Time</td>
</tr>
<tr>
<td>Concurrent Engr.</td>
<td>X</td>
</tr>
<tr>
<td>Push design to suppliers</td>
<td>X</td>
</tr>
<tr>
<td>DFM/DFA</td>
<td></td>
</tr>
</tbody>
</table>
Two tactics for reducing time required in product development are use of concurrent engineering, and requiring suppliers to provide subsystem design and engineering. The latter is also often used to try to reduce costs. Design for manufacture and/or assembly methods are vehicles primarily used to promote product quality and reduce cost. Description and explanation of these activities and their purported impact is given below. Each activity depends on a small number of factors for its success. These critical success factors are given and the scenarios' performances across them are examined in the final section.

6.2.1 Concurrent Engineering

Concurrent engineering describes the use of overlapping design, product engineering and manufacturing activities to accelerate product development. Instead of performing these functions successively as is standard practice, an attempt is made to perform a number of them simultaneously. Concurrency is typically facilitated by involving representatives from the manufacturing organization early on with the design team responsible for the product development, which encourages rapid communication of information about the product to the manufacturing floor, and incorporation of design for assembly and design for manufacturability principles in the design.
6.2.2 Require Suppliers to Provide Subsystem Design

Another tactic frequently employed in firms' attempts to reduce the product development cycle (PDC) is to require suppliers to supply the design as well as manufactured components, that is, to "push" subsystem design down to the suppliers level. The goals of this tactic are usually 1) to decrease the PDC by achieving a degree of concurrency in subsystem development, and 2) to take advantage of advantageous supplier cost structures.

With respect to its first goal, this activity is similar to concurrent engineering. The usual *modus operandus* is to "freeze" interface specifications early in the development process to allow the supplier an immediate design start. This tactic is particularly effective when the subsystem is mature or not critically linked to the rest of the product. It differs from concurrent engineering in the nature of the transactions - they are now across firm boundaries, and in its expansion of the pool of resources that can be applied to the development effort to include non-firm related assets.

The tactic can be used to reduce cost if the supplier has a lower cost structure than the buyer. This may be the case if, for example, the supplier employs a lower cost work force or enjoys special economies of scale due to its focus on a specific product or technology.
6.2.3 Design for Manufacture/Assembly

Design for manufacture and assembly approaches are methods for inserting manufacturing and assembly expertise into the design process so as to insure that manufacturability (including assembly) and thus product quality and cost effectiveness. Two means of achieving this are, first, to teach designers about manufacturing and assembly processes, and, second, to form teams containing people from manufacturing and assembly functions with designers and engineers\(^2\). Of these the more commonly used seems to be the second\(^3\), or a combination of the second combined with the first.

6.3 Scenario Performance

The analysis of the success of these activities in Scenarios I - III is aided by the identification of, for each tool or activity, a small set of factors critical to its success. This section identifies and groups the critical success factors and rates the scenarios' performance in promoting them.

\(^2\)Other approaches for achieving high quality through design include using design rating approaches and structured design approaches such as “axiomatic” design. While these methods show promise they are neither commonly used nor would they be differentially impacted by Scenarios I - III. Thus, they are not considered further here.

\(^3\)In addition to transferring information, the formation of joint teams enables concurrency between engineering and manufacturing and gets manufacturing to “buy-in” to the product.
6.3.1 Critical Success Factors for Development and Manufacturing Tools

Table 6.2 gives the product development and manufacturing tools considered earlier and a list of critical success factors associated with each. As before, this list is limited to those factors that are most likely to vary across SI - SIII.

Table 6.2: Critical Success Factors

<table>
<thead>
<tr>
<th>Tools</th>
<th>Critical Success Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrent Engineering</td>
<td>Ease of Information Flow</td>
</tr>
<tr>
<td>Push Design to Suppliers</td>
<td>Ease of Information Flow</td>
</tr>
<tr>
<td></td>
<td>Existence of Low Cost Structure</td>
</tr>
<tr>
<td>DFM/DFA</td>
<td>Ease of Information Flow</td>
</tr>
</tbody>
</table>

The key factor in both concurrent engineering and using suppliers as designers is the easy flow of information. Where it exists potential time savings due to concurrency are large, where it does not, concurrency will likely lead to slipped schedules as unforeseen changes force expensive engineering changes and retooling. A second critical factor for pushing design down to suppliers due to the second goal relative to the goal of cost-effectiveness is existence of suppliers with a comparatively low cost base. The most important factor in the application of DFM/A, clearly is also the ease and volume of information flows between the product design and manufacturing.
6.3.2 Scenario Evaluation

Scenario I

In this scenario design and manufacturing of functional subsystems would be performed within KAD. Concurrent engineering and DFM/A is enabled by the integration of engineering, design, and manufacturing at the component and subsystem levels of the organization; and, information flow between the formerly separated functions would be facilitated. However, an organizational barrier now exists between the subsystem activities of design, fabrication and assembly, and the systems design and integration activities. Care must be taken to implement DFM and DFA at the across this new boundary level.

Scenario II

The amount of communication between tiers will be determined in part by the amount of interlocking ownership and the level of trust that is developed between buyers and suppliers. While many years of experience in Japan demonstrate that this system has high potential [Nishiguchi 1987, 1989], transition to this system will take some time and may be problematic.

Scenario II does offer a potentially lower cost base. Former KAD units that are now independent companies will have to lower their wage and increase their asset utilization rates to match their competition. This will
have a substantial effect in units that utilize labor intensive low
technology processes.

Scenario III
This scenario offers a close bond between product development and
fabrication and intermediate assembly functions resulting from their
organizational and physical proximity. Ease and volume of information
flow can be expected to be high. As such, given the availability of
adequate design capability and manufacturing capacity a high degree of
concurrency is possible and DFM/A activities will be practicable.

Because the manufacturing units in this scenario are integrated into LoBs
and therefore likely to maintain the Kodak wage structure, attainment of
relatively low costs in this scenario (as in Scenario I) is unlikely.
The third dimension on which Scenarios I - III will be compared is "quality of work life". Quality of work life (QWL) is an expression used within Kodak to describe employees' overall level of satisfaction with job, management, and company. This dimension is chosen because employee welfare is a stated goal of the company on which historically it has placed a premium, and because the rapid changes and large scale layoffs of recent years appear to have caused an overall decline in morale as indicated by recent attempts at achieving unionization at Kodak facilities in Rochester. From a corporate perspective these latter attempts should make the maintenance of a positive and stable QWL the more important.

To facilitate the comparison, quality of work life is broken up into three components, job security, job satisfaction, and compensation and benefits. These factors are discussed in Sections 7.1 - 7.3, below, with evaluation of scenarios integrated into the discussion. It should be noted, however, that the primary factor affecting QWL appears to be the economic success of organizational structures described by each scenario. As such, QWL is in many ways a derivative of some of the issues discussed in the previous two chapters.
7.1 Job Security

Job security is defined simply as the likelihood of retaining one’s job and level of compensation. Figure 3.1 shows that between 1982 and 1989 KAD downsized by over 6000 people, well over 50% of its 1982 employment. A majority of those departing were full-time regular employees. While many of these departures were induced by attractive separation packages, many others were involuntary.

The downsizings were primarily the result of decreases of the business volume of the manufacturing units. In Scenarios I & III the level of job security can be described as "low" based on this data. Scenario I and, especially, Scenario III retain exposure to the volume volatility inherent in a high concentration of customers. Neither has the requisite flexibility to adapt to these volume changes.

Job security in Scenario II is better than that in Scenarios I & III because volume fluctuations in Kodak related business can be compensated for with outside sales. In the long term the job security of each unit will be similar to the average in its industry.
7.2 Job Satisfaction

Although the job contents of the majority of employees in Scenarios I, II, and III may vary, no differential impact on scenarios' long term quality of work life is seen, although there may be a short term negative response of those workers in Scenario II that loose affiliation with Eastman Kodak.

7.3 Compensation & Benefits

Eastman Kodak is known for being a relatively high labor rate employer with the bulk of the shop floor fabrication labor force being paid substantially above prevailing wage rates. Since it is unlikely that the Kodak corporate wage structure will change rapidly, Scenarios I & III can be characterized as “high” in this QWL dimension. In Scenario II, on the other hand, wage rates will tend to approach the industry median thus giving this scenario a “medium” ranking.

7.4 Conclusions

Table 7.1 gives a summary of the above results. No scenario appears to be superior in all three categories. A straightforward addition of ratings would rank the scenarios equally with Scenarios I & III performing better in terms of compensation and benefits and Scenario II rating higher in job security.
An alternate interpretation is that these three dimension form a hierarchy of QWL with job security at the top level and job satisfaction and compensation at the second level. This is likely to be a more accurate description of the human dynamics since employees may have job security without satisfaction and adequate benefits, but not vice versa. If the latter definition is used, Scenario II appears to be more attractive.

Table 7.1: QWL Results of Scenarios I - III

<table>
<thead>
<tr>
<th></th>
<th>Scenario I</th>
<th>Scenario II</th>
<th>Scenario III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Security</td>
<td>low</td>
<td>medium</td>
<td>low</td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>no significant change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensation &amp; Benefits</td>
<td>high</td>
<td>medium</td>
<td>high</td>
</tr>
</tbody>
</table>
The previous three chapters have evaluated Scenarios I - III by looking primarily at how financial returns of Kodak, LoB equipment products, and quality of work life of employees are affected by the organization of manufacturing activities in these scenarios. This chapter addresses the question of whether the combination of the manufacturing and service oriented assets embodied by each of the scenarios add value to Eastman Kodak that is higher than the sum of the individual value additions.

Implicitly, this question has been at the core of the discussion in the previous chapters. RoA, good products, and a quality work life are a function of a complete enterprise, and thus serve as metrics of the synergy between its various parts. However, the previous discussion has been focused on core manufacturing. It is useful, therefore, to examine more specifically the question of synergies between core services and core manufacturing.

Two categories of support services, manufacturing related services and site related services can be identified. In the first category are those support services that are directly involved with the business of
developing and producing equipment, or accounting for the transactions involved in these activities. These include material management, planning and industrial engineering, product/technology development services of the technical center, and the accounting organization. In the second category, is the bulk of what is known as "facilities" or the Site Management Organization. This organization performs functions such as housekeeping, mail distribution, site construction, plant security, and maintenance of production equipment, that primarily relate to the physical KAD site.\(^1\)

This categorization is used because it highlights a key difference between the two types of support. The manufacturing-related activities, because of their close ties to manufacturing can be sources of competitive advantage. Thus Kodak ownership of these activities is likely to be required. The site-related activities, on the other hand, do not have such ties, are not likely to be a source of competitive advantage, and, therefore, are candidates for outsourcing.

The structure of the discussion in this chapter given in Table 8.1 follows this reasoning. First arguments for and against centralization of manufacturing related activities are presented and discussed. This is followed by a discussion of outsourcing versus internalization issues.

---

\(^1\)This is not an entirely "clean" categorization. Some SMO activities such as equipment maintenance clearly fall into the equipment related category and must be considered as such.
associated with facilities management, and, for those activities to be internalized, centralization versus integration. Finally, some comments about the effect of Scenarios I - III on these issues and, thus, on possible synergies are given.

Table 8.1: Chapter Outline

<table>
<thead>
<tr>
<th>Manufacturing Related</th>
<th>Site Related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comptroller</td>
<td>Site Management</td>
</tr>
<tr>
<td>Material Management</td>
<td>Issues:</td>
</tr>
<tr>
<td>Planning &amp; IE</td>
<td>Outsourcing vs.</td>
</tr>
<tr>
<td>Technical Center</td>
<td>Internalization</td>
</tr>
<tr>
<td></td>
<td>Centralization vs.</td>
</tr>
<tr>
<td></td>
<td>Integration</td>
</tr>
</tbody>
</table>

8.1 Manufacturing Related Support Services

8.1.1 Advantages of Centralization
Table 8.2 gives arguments for centralization. They are categorized by whether they apply to a wide range of activities or are likely to hold only for specific service units.

Table 8.2: Arguments for Centralization

<table>
<thead>
<tr>
<th>Generic Reasons for Centralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Economies of scale in training and management</td>
</tr>
<tr>
<td>• Ability to develop expertise in specific areas</td>
</tr>
<tr>
<td>• Flexibility in the deployment of resources</td>
</tr>
<tr>
<td>• Ability to attract good people</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific Reasons for Centralization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accounting</strong></td>
</tr>
<tr>
<td>• Independence of financial reporting</td>
</tr>
<tr>
<td>• Easy access to consolidated information</td>
</tr>
<tr>
<td><strong>Technology Development</strong></td>
</tr>
<tr>
<td>• Critical mass required for process/product devel.</td>
</tr>
</tbody>
</table>

The primary generic argument for centralization is the degree of leverage that can be obtained from maintenance of a functionally specialized group of individuals. Individuals within such a group can specialize on areas of interest, e.g., commodities purchasing. It is also possible to establish professional advancement routes within the function, which may aid an organization's ability to attract promising individuals who are particularly interested in that function.
Several factors are specific to one or more functions. Centralized accounting is likely to increase the ease with which consolidated information can be accessed, and provides financial reporting that is independent of specific business units. Economies of scale are likely to be important in technology development because this activity is often capital equipment intensive and may benefit from interaction between individual contributors.

8.1.2 Advantages of Decentralization

Table 8.3 gives some advantages of decentralization.

Table 8.3: Arguments for Decentralization

<table>
<thead>
<tr>
<th>Some Advantages of Decentralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• encourages focus on the business</td>
</tr>
<tr>
<td>• matches accountability with power</td>
</tr>
<tr>
<td>• establishes local control and thereby encourages rapid decisionmaking at low levels</td>
</tr>
<tr>
<td>• encourages individuals to be active across functions</td>
</tr>
</tbody>
</table>

The primary advantage of decentralization is that it establishes "companies within companies". Activities of the business are contained in and owned by the business, accountability lies within the
business and the focus of employees is more likely to be on the business and its customers rather than on functional groups that span several businesses. Also, the increased likelihood of individuals being active across functions is a positive factor in rapid information flow between activities.

8.1.3 Discussion: Pros and Cons of Centralization

The issue of centralization is at the core of and of fundamental importance to the organization and management of business. Centralization can be a positive or a negative factor, depending on the function in question and the environment in which the business operates.

A high degree of centralization may be appropriate in situations where the activity in question is relatively static and where its boundaries and roles are well defined. In this case economies of scale may provide appreciable returns. A high degree of centralization may also be appropriate in activities such as process/technology research that depend highly on economies of scale, be that in capital or human assets, for efficiency.

Decentralization encourages local ownership, focus of everyone in a business unit on the requirements of that business, decisionmaking at low levels of the organization and, thus, organizational flexibility. In
general, one may expect an increasingly dynamic environment to require increasing levels of decentralization especially if the activity under consideration is integrally involved in this environment.

8.1.4 Conclusion

Given these premises and the fact that the KAD business environment has become increasingly competitive with the decline of camera manufacturing, it is likely that decentralization of the manufacturing related services will have positive effects\(^2\). Since change in business conditions is likely to increase, with what appears to be an increasing rate of technological progress and intensified worldwide competition, it is probable that synergy for Eastman Kodak equipment manufacturing lies not in the functional separation of the support services but rather in their integration with manufacturing and LoB units.

8.2 Site-Related Support Services

The Site Management Organizations (SMO) provides site-related support activities. It is a diverse organization, the largest units of

\(^2\)In fact, decentralization of information and accounting systems has been underway for some time. Likewise, Copy Products has internalized much of the materials procurement function and reports positive results.
which are involved with, in order, providing building services, plant security, and construction management services (see Figure 8.1). With a total employment relatively constant at approximately 1000 to 1200 (see Figure 3.1) for most of the 1980s this organization has long been one of the largest at the KAD site.

Figure 8.1: SMO Units Ranked by Number of Employees

8.3.1 Organizational Alternatives

While the issue of centralization is pertinent here as well, a fundamental alternative that should be considered is outsourcing of non-strategic functions currently performed by SMO. While a savings of costs would likely be a result, the primary goal of outsourcing would be to increase the focus of KAD core and of the LoBs on site on their target: development
and manufacture of equipment. It is difficult to argue, for example, that building services performs a strategically important function for Eastman Kodak or that plant security could not be performed with equal or greater efficiency by an outside contractor without compromising security.

Although vertical integration has been a hallmark of Kodak culture (see Section 2.2.1), recent contractual agreements with IBM and DEC [Cworld 1990] to provide information and communication services are indicative of a new understanding of the competitive costs of such a policy. The agreements might serve as a model to outsourcing building services. Each was a long term contract with a firm whose area of expertise was closer to the service in question than was Eastman Kodak's. In both cases the vendor guaranteed a large percentage of Kodak employees positions in the new organization.

After possible outsourcing decisions have been made, centralization becomes the issue in question. Following the discussion above, the production equipment maintenance function appears to be a candidate for integration with manufacturing units. The remaining functions, because of their relatively static nature are likely candidates for continued centralization.
8.4 Scenario Performance

Good scenario performance in this context is that which encourages the changes suggested above:

- Increased decentralization of accounting, materials management, planning and industrial engineering and the technology center

- Focus on apparent lack of synergy of site management with core manufacturing and determine viability of outsourcing and some subsequent decentralization.

Scenarios II appears to be most likely to move support services in these directions. Organizations in Scenario II would be likely to integrate key support functions and, site-related support might easily be reincarnated as a lower tier organization.

With the exception of integrating technology development, Scenario I does not directly address any of the support organizations. Because integration of support functions would be a logical step after division and integration of core manufacturing into the LoBs, Scenario III is more likely than Scenario I to be beneficial.
PART III

Summary
Summary

Chapter 9

This study has examined the manufacture of equipment at Eastman Kodak Company and, specifically, the current and potential future roles of Kodak Apparatus Division (KAD) in this process. This chapter summarizes the results of this study.

At present, Eastman Kodak Lines of Business (LoBs) develop and assemble equipment but purchase the bulk of the required components. Kodak Apparatus Division (KAD) the internal, captive, shared components producer competes with outside vendors for much of this parts fabrication business, and, to a limited extent, for the design and engineering of these components.

KAD's high cost labor base, a history of perceived substandard performance on quality, delivery, and cost metrics, and a decline in its core camera manufacturing business, resulted in a lack of capacity utilization and a crisis of confidence in KAD's viability. While KAD significantly improved its performance in the mid to late 1980's, perceptions of lack of viability still seem to be held widely by some of its LoB customers. The purpose of this study was to examine alternate
equipment manufacturing scenarios that might improve the overall competitiveness of Kodak equipment manufacturing and, it is hoped, the viability of KAD.

9.1 Three Alternate Equipment Manufacturing Scenarios

Three scenarios are proposed as vehicles for investigating possible future roles of KAD in equipment manufacturing:

Scenario I: KAD remains captive supplier to Kodak LoB customers exclusively but develops its design, fabrication and assembly capabilities to enable it to provide subassemblies and subsystems, instead of single parts or components. Control of KAD resides in a Board comprised of LoB, KAD, and corporate executives.

Scenario II: KAD becomes a number of autonomous and self-contained companies, with varying degrees of Kodak ownership, depending on the companies’ technological status and strategic importance to LoBs.

Scenario III: KAD is broken into discrete manufacturing units by customer or group of customers, and control of each unit is transferred to each LoB customer or group of customers.
Scenarios I and III were derived from suggestions coming from within Eastman Kodak as to possible future organizational forms and roles for KAD. Scenario II is a formalization of a system of business transactions observed in the Japanese automotive and electronic industries and, to a more limited extent in US firms.

9.2 Framework for Analysis

The scenarios were evaluated for their impact along four dimensions:

1. *Eastman Kodak return on assets*: how will the scenarios compare in their contribution towards the satisfaction of corporate financial goals.

2. *Timely, cost effective, quality products*: what relative effect will the scenarios have on producing quality products in a timely and cost effective manner.

3. *Quality of work life*: how do scenarios compare on likely effect on the quality of an employee's work environment.

4. *Synergy between units*: in which scenario is the synergy between units likely to be highest.
These dimensions cover financial, product and people related metrics that provide means for comparison of the scenarios with each other and, as appropriate, with the present KAD organization.

To allow relative evaluation of the scenarios, critical factors in each of the dimensions were identified (see Table 9.1). These factors have impact on the dimensions and are likely to differ across the scenarios.

Table 9.1: Critical Factors in Evaluation

<table>
<thead>
<tr>
<th>Critical Factors</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td></td>
</tr>
<tr>
<td>Asset Utilization</td>
<td>Volume Volatility</td>
</tr>
<tr>
<td></td>
<td>Economies of scale</td>
</tr>
<tr>
<td>Asset Flexibility</td>
<td>Organizational Flexibility</td>
</tr>
<tr>
<td>Products</td>
<td></td>
</tr>
<tr>
<td>Concurrent Engineering</td>
<td>Ease of Information Flow</td>
</tr>
<tr>
<td>Suppliers -&gt; Design</td>
<td>Low cost structure</td>
</tr>
<tr>
<td></td>
<td>Ease of information flow</td>
</tr>
<tr>
<td>DFM/DFA</td>
<td>Ease of information flow</td>
</tr>
<tr>
<td>QWL</td>
<td></td>
</tr>
<tr>
<td>Job Security</td>
<td>Economic Success</td>
</tr>
<tr>
<td>Compensation/Benefits</td>
<td>Economic Success</td>
</tr>
<tr>
<td></td>
<td>EK corporate affiliation</td>
</tr>
<tr>
<td>Synergy</td>
<td>Horizontal Activities</td>
</tr>
</tbody>
</table>
Asset utilization and flexibility were proposed as critical factors for examination of RoA issues, with volume volatility and economies of scale, and organizational flexibility likely to determine utilization and flexibility, respectively.

The ability of equipment manufacturers to take advantage of concurrent engineering and design for manufacture/assembly methods, and to require suppliers to provide design in addition to fabrication services are suggested as being influential in determining product cost, quality, and time-to-market. The success of these methods is likely to depend on the ease of information flow within organizations and across organizational boundaries. The cost structure of suppliers is also an important factor. Both are likely to vary across Scenarios I - III.

Quality of work life is likely to be determined in part by perceived job security as well as compensation and benefits. (Another factor - job satisfaction is important but is not likely to vary across scenarios) Job security is most likely to be determined by the economic success of the particular scenario. Level of compensation is related to Kodak policies and, therefor, to the degree of affiliation of organizations in a scenario with Eastman Kodak.

The degree of synergy increases with increased horizontal integration across business units, through, for example shared processes or technology.
9.3 Scenario Performance Across the Dimensions

The scenarios were then evaluated with respect to each of these critical factors. A summary of this evaluation is given in tabular form below.
<table>
<thead>
<tr>
<th></th>
<th>Scenario I</th>
<th>Scenario II</th>
<th>Scenario III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RoA</strong></td>
<td>Limited ability to respond to production volume fluctuations due to high customer concentration and low overall flexibility are likely to result in low long term economies of scale and poor-to-mediocre RoA.</td>
<td>Flexible organization is market oriented and likely to be most competitive of SI - SIII, thus resulting in relatively positive impact on Kodak RoA</td>
<td>Combination of high volume volatility, high asset base in fabrication that will act as anchor to LoBs, seriously reducing flexibility, loss of economies of scale likely to have serious negative effect on contribution to RoA.</td>
</tr>
<tr>
<td><strong>Prod.</strong></td>
<td>Mixed/uncertain results. Products will benefit given the premise that integration of subsystem design w/ manufacture and assembly is more important than integration of subsystem into complete system.</td>
<td>Cost structure likely to be improved relative to SI &amp; SIII. Establishment of strong ties between firms will determine ease of communication and thus affect quality and time-to-market.</td>
<td>Close bond between design, engineering, fabrication, and assembly functions is likely to lead to short time-to-market and high quality. However, high cost structure will lead to relatively high product costs.</td>
</tr>
<tr>
<td><strong>QWL</strong></td>
<td>Due to volatility, low job security and hence low QWL are likely. However, those that remain employed are well compensated.</td>
<td>In steady state, employee characteristics will be similar to those in industry - expect &quot;medium&quot; QWL</td>
<td>Similar to Scenario I. Higher volatility.</td>
</tr>
<tr>
<td><strong>Synergy</strong></td>
<td>Excessive vertical integration unlikely to be addressed due to persistent culture and traditions.</td>
<td>Differing levels of synergy between service and manufacturing units likely to be addressed via selective outsourcing, decentralization, centralization as appropriate to establish business focus.</td>
<td>Similar to Scenario I. However, increased focus on support services is likely after integration of core manufacturing and may result in positive change.</td>
</tr>
</tbody>
</table>

Table 9.2: Results of Scenario Evaluation
Specific recommendations for Kodak Apparatus Division based on these conclusions are presented in [Loyd 1990]
Organizational Change And Implementation Issues

Appendix

This appendix examines issues associated with implementation of Scenario I - III. In the first of two parts, pertinent stakeholder groups are identified and their contention and/or agreement with the potential changes are examined. In the second half of the appendix, steps necessary for implementation are discussed.

A.1 Stakeholders

A.1.1 Relevant Stakeholders in Scenarios I - III

Table A.1 gives the stakeholders relevant for this analysis.

Table A.1: Stakeholders in Scenarios I - III

<table>
<thead>
<tr>
<th>KAD Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAD Management</td>
</tr>
<tr>
<td>KAD Customers</td>
</tr>
<tr>
<td>Kodak Corporate Management</td>
</tr>
<tr>
<td>Kodak Shareholders</td>
</tr>
</tbody>
</table>
Each of these groups of people are stakeholders in KAD and have some influence over its operation:

- **KAD employees** will be directly affected by and play a major role in each of the scenarios.

- The commitment of the managers to whatever scenario is chosen is critical. Without management playing a large role in providing leadership, educating and counseling, and, most importantly communicating information and achieving buy-in at all levels none of these strategies can be successful.

- After KAD management, **LoB management** by virtue of its role in managing the operating units of the Eastman Kodak Company has perhaps the most prominent role in deciding KADs future. Because they each purchase a significant percentage of their components at KAD they will be directly affected by any changes. Their response can be expected to be differ significantly across the proposed scenarios.

- **Corporate management** is ultimately responsible for every area of the company.
• *Shareholders* ¹ and business analysts have in recent years played an increasingly active role in being critical for what they seem to perceive as a slow rate of change.

Several other groups of stakeholders exist; however, they are unlikely to affect implementation of any of the scenarios. For example, KAD’s suppliers are certainly stakeholders but are unlikely to have much influence on possible restructurings.

The next three sections examine the potential impact of SI - S3 on these stakeholders.

**A.1.2 Stakeholder Issues in Scenario I**

Table A.2 gives the primary issues of Scenario I relative to the stakeholders identified above. A discussion of each of the issues follows.

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¹Many of these are also employees.
Table A.2: Stakeholder Issues in Scenario I

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAD Employees</td>
<td>- Change in job content towards more cross functional activities</td>
</tr>
<tr>
<td>KAD Managers</td>
<td>- Direct LoB involvement and control through KAD “Board”</td>
</tr>
<tr>
<td>LoB Management</td>
<td>- Transfer of subsystem design and assembly functions</td>
</tr>
<tr>
<td></td>
<td>- Commitment to participate in governance</td>
</tr>
<tr>
<td></td>
<td>- KAD support for part requirements</td>
</tr>
<tr>
<td>Kodak Corp. Mngmt.</td>
<td>- No major issues</td>
</tr>
<tr>
<td>Kodak Shareholders</td>
<td>- No major issues</td>
</tr>
</tbody>
</table>

- Overall, this scenario does not pose any major changes to its employees and they are unlikely to resist it.

- Because most of Scenario I is modeled after management's vision of KAD's future, the commitment of KAD management is not an issue. However, the part of SI that is not part of KAD's vision - KAD governance by a board including its customers - is likely to be resisted. This is because some KAD managers regard a LoB managers as unduly cost sensitive, shortsighted with respect to manufacturing, and disinterested in the long term survival of core manufacturing. Although the presence of a corporate executive on the board mitigates the threat of LoB control, this is still likely to be a major factor in resistance to at least this part of the scenario.

- Scenario I in effect calls for a transfer of a set of resources/functions (subsystem design and assembly) from the
LoBs to KAD. It is not clear whether the LoBs feel this is in their best interest. It is also not clear how LoBs would regard the KAD board. While this gives them a measure of direct control over assets they in fact own, it also represents an additional time commitment.

- Corporate management seems to have bought into the KAD vision, and, the proposed governance structure is likely to be approved if KAD and LoB support is evident.

- Since KAD is a relatively small part of the company, shareholders or security analysts are unlikely to analyze what they would consider a minor shift in direction.

A.1.3 Stakeholder Issues in Scenario II

Table A.3 gives the primary issues of Scenario II relative to the stakeholders. A discussion of each of the issues follows.

2Discussions with several LoB manufacturing managers revealed a mixed (positive and negative) response to this query.
Table A.3: Stakeholder Issues in Scenario II

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAD Employees</td>
<td>Job security</td>
</tr>
<tr>
<td>KAD Managers</td>
<td>Job security</td>
</tr>
<tr>
<td></td>
<td>Expanded responsibilities</td>
</tr>
<tr>
<td>LoB Management</td>
<td>Adherence to contracts</td>
</tr>
<tr>
<td></td>
<td>Support for part requirements</td>
</tr>
<tr>
<td>Kodak Corp. Mngmt.</td>
<td>Public perception</td>
</tr>
<tr>
<td>Kodak Shareholders</td>
<td>No major issues</td>
</tr>
</tbody>
</table>

- The change of culture implied by this scenario is bound to be difficult and likely to be resisted by employees, especially since the need for change is not perceived as being pressing. The degree of resistance will vary with perception of degree of job security.

- Scenario II will result in more flexibility (through ability to value price) for KAD managers, however with this flexibility comes bottom line profit and loss responsibility. Most managers will appreciate the leverage that pricing flexibility can give them. However, perceptions of profit and loss responsibility are likely to vary. Those managers that expect to be a step ahead of the competition will be comfortable with carrying this responsibility those that feel they may not be competitive with other vendors will resist having it.

- In this scenario LoBs would be closely involved with firms representing resources and manufacturing technologies of the
LoB's choice, and would be at "arms-length" from those (presumably lower tier) firms whose products are not strategically important to them. The power and flexibility that the LoBs would enjoy in this relationship would be a strong selling point for this scenario. The question of whether existing contracts would continue to be honored would be a negative factor.

- Public perception will be an important issue to Kodak management, especially in light of recent discussions of unionization in some Kodak facilities. The expected cash flow from sales of assets is a positive factor.

- In general, opinion on Wall Street seems to be that Kodak cost cutting efforts have been too limited. Thus, the reduction in asset base and positive cash flow that is one attribute of this scenario would likely be seen positively by analysts and shareholders.

A.1.4 Stakeholder Issues in Scenario III

Table A.4 gives the primary issues of Scenario III relative to the stakeholders. A discussion of each of the issues follows.
Table A.4: Stakeholder Issues in Scenario III

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAD Employees</td>
<td>- Relocation, Breakup of groups</td>
</tr>
<tr>
<td>KAD Managers</td>
<td>- Job Security</td>
</tr>
<tr>
<td>LoB Management</td>
<td>- Increased management complexity</td>
</tr>
<tr>
<td>Kodak Corp. Mngmt.</td>
<td>- No major issues</td>
</tr>
<tr>
<td>Kodak Shareholders</td>
<td>- No major issues</td>
</tr>
</tbody>
</table>

- Employees will be faced with major disruptions in their work life. Division of units and integration into LoBs will result in massive work relocation.

- The short term outlook in this scenario is fraught with uncertainty for core manufacturing managers, especially those at the department and unit level. The breakup and redistribution of manufacturing assets and people in this scenario will lead to a large scale movement of managers and a redefinition of their roles. Some managers will fare others will do poorly. Moreover, those managers that do obtain comparable positions in LoB manufacturing organizations will be faced with a new business environment to which they will have to adopt.

- LoBs have already shown considerable reluctance to manage as well as own parts of KAD manufacturing. It seems unlikely that the large scale transfer envisioned in this scenario will positively change this sentiment.
• Integration of fabrication into the LoBs seems to have been one of the intentions of the 1985 restructuring, and was mentioned to the author as a likely option by one senior executive.

• Because of KAD's relatively small size, outside shareholders are unlikely to be concerned.

A.2 Implementation/Transition Approaches

This section briefly discusses the implementation of Scenarios I - III. From the discussion above, one implementation factor is common across the three scenarios can be identified: importance of customer involvement. Lack of customer support in any of the three scenarios bodes its doom. The truth of this statement is obvious in regard to Scenario III, but, in fact, customer involvement and acceptance is equally critical in Scenarios I & II. In Scenario I, LoBs may simply choose not to abdicate their subsystem design and assembly effort to KAD, or participate in the governance of the organization. Similarly, LoB support would be required in the transition from the present to Scenario II if ties to Eastman Kodak are to be maintained.

A.2.1 Implementation and Transition Issues in Scenario I

The question of implementation of Scenario I is focused on the manufacturing units involved with the production of mechanical parts, prototypes, and customized equipment, as well as the technical services
organization which houses contract design and engineering support services³.

After LoB support is obtained the following issues need to be addressed:

- divestiture of mature technology which is unlikely ever to be cost effective at KAD
- development of clear vision of assembly of higher order subassemblies
- planning for exiting the bulk of the (single) component manufacturing business, which does not fit into the Scenario I framework

A.2.2 Implementation of Scenario II

A two phase approach is suggested for implementing Scenario II:

**Phase 1: Establish Core Mfg. RoA Responsibility & Authority**

In this phase KAD would be transformed to a profit center, with value pricing to all customers internal and external and minimum

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³The electronic and optical products organizations have already integrated design and manufacturing activities. The products produced by those units are complex and multifunctional devices that arguably represent high value added. <-- put in Scenarios chapter!!
external sales restrictions. The primary purpose of this phase of the implementation is to establish a true profit center mentality at all levels of the organization. As such return on asset responsibility should be cascaded downwards throughout the organization simply by setting RoA goals for each of the unit managers. Initial RoA goals might be modest to account for the difficulty of coping with rapid change, however, this should rise to the corporate wide requirements within a negotiated time frame.

**Phase 2: Establish Kodak-aligned public corporation(s)**

Cascading downwards of bottom line responsibility will occur naturally as the RoA goals are raised to match the standard corporate rate. Those portions of the organizations that over some period of time can not supply that rate of return should be considered for divestiture, possibly by sale to employees, public placement, etc. At this point, LoBs can choose their level of involvement with a given unit or subunit thus establishing the begin of a tiered structure.

**A.2.3 Implementation of Scenario III**

The key problems in establishing Scenario III assuming LoB buy-in has occurred is the physical division and relocation of manufacturing equipment and systems (eg. shop floor control) and the reassignment of people. A recent Kodak-internal study on a “market cluster” approach to
determining KAD/LoB alignments may be helpful in regard to the first issue [Melone 1988].
References


[Ackerman 1930A] Ibid. p. 46
[Ackerman 1930B] Ibid. p. 23
[Ackerman 1930C] Ibid. p. 115
[Ackerman 1930D] Ibid. p. 149
[Ackerman 1930E] Ibid. p. 235
[Ackerman 1930F] Ibid. p. 237
[Ackerman 1930G] Ibid. p. 355


[Alt 1986B] Ibid. p. 220
[Alt 1986C] Ibid. p. 235
[Alt 1986D] Ibid. p. 183
[Alt 1986E] Ibid. p. 233


[Holmes 1930A] Ibid. p.34
[Holmes 1930B] Ibid. p. 35


[Subak 1987A] Ibid. p. 8
[Subak 1987B] Ibid. p. 10


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