

Diskussionsbeiträge des Instituts für Wirtschaftswissenschaften  
der Universität Klagenfurt

**No. 9803**

**Strategic Management  
in Converging Industries**

B. Kaluza / Th. Blecker / Ch. Bischof

Universität Klagenfurt  
Institut für Wirtschaftswissenschaften  
Abteilung Produktions-, Logistik- und Umweltmanagement  
Universitätsstr. 65 - 67  
A - 9020 Klagenfurt  
Telefon: (+43) 04 63 / 27 00 - 846  
Telefax: (+43) 04 63 / 27 00 - 849

November, 1998

**DISCUSSION PAPER OF THE COLLEGE OF BUSINESS ADMINISTRATION  
UNIVERSITY OF KLAGENFURT, AUSTRIA**

ISBN 3-85496-000-X

o.Univ.-Prof. Dr. Bernd Kaluza, Head of the Department of Production Management, Business Logistics and Environmental Management, College of Business Administration, University of Klagenfurt, Austria

Dipl.-oec. Thorsten Blecker, Instructor and Research-Assistant at the Department of Production Management, Business Logistics and Environmental Management, College of Business Administration, University of Klagenfurt, Austria

Mag. Christian Bischof, MBA, Instructor and Research-Assistant at the Department of Production Management, Business Logistics and Environmental Management, College of Business Administration, University of Klagenfurt, Austria

## Table of Contents

	Page
Table of Figures	IV
1 Introduction	1
2 Characteristics of Digital Convergence	1
3 Strategic Implications of Digital Convergence	5
3.1 Implications on Industry Structure	5
3.2 Implications on Critical Success Factors	11
3.3 Implications on Generic Strategies	18
4 Dynamic Product Differentiation Strategy as Strategic Response to Digital Convergence	23
4.1 The Concept of Dynamic Product Differentiation	23
4.2 Effectiveness of Dynamic Product Differentiation in Converging Industries	26
4.3 Implementation of the Dynamic Product Differentiation Strategy	30
5 Conclusion	33
Bibliography	37

## Table of Figures

	Page
Figure 1: Digital Convergence and INFOCOM	6
Figure 2: Changes in Industry Structure due to Digital Convergence	10
Figure 3: Implied Changes on the Strategic Importance of Critical Success Factors	11
Figure 4: Modified Experience Curve Effect	13
Figure 5: Consequences of Digital Convergence on Generic Strategies	22
Figure 6: Dynamic Product Differentiation Strategy	25

## Abstract

This paper provides a discussion of the consequences of digital convergence on strategic management. The process of digital convergence was initiated a few years ago by the rapid progress in digital technologies and has gained increased practical importance since then. In order to show its multiple effects on strategic management we choose a three-steps approach for this analysis.

In a first step we investigate the implications on industry structure based on Porter's concept of structural analysis of industries. Due to digital convergence three competitive forces are supposed to increase while two others are affected indifferently. This shift in the strengths of these five forces leads to an overall increase of competition in the information and communication industry (INFOCOM) industry. Following the structure-conduct-performance-paradigm we infer that the profitability of the industry will decline.

The second step of our analysis aims at investigating the implications on critical success factors. For this purpose we examine four major critical success factors: costs, differentiation, flexibility, and time. We notice direct and indirect shifts in the strategic importance of major critical success factors. While the strategic importance of costs and quality is decreasing that of flexibility and time is substantially enhanced.

These implications on major critical success factors have significant consequences on Porter's widely used generic strategies. Therefore, in a third step we analyze the implications of digital convergence on these strategies. Our analysis reveals major conceptual drawbacks of Porter's generic strategies and shows a reduced effectiveness of these strategies in the INFOCOM industry. These drawbacks make it virtually impossible for a company to position itself uniquely in INFOCOM by pursuing the generic strategies.

Therefore, we introduce the Dynamic Product Differentiation Strategy which considers the implications of digital convergence. This strategy stresses the notion of gaining a competitive edge by focusing on costs, differentiation, flexibility, and time simultaneously. Thus, it enables companies to respond to the high complexity and dynamics of INFOCOM by reacting to changes in customer needs in a fast and cost effective manner and still providing a high level of quality.

## 1 Introduction

On April 23, 1998, Siemens AG, Munich, Germany, launched a widely noticed press release. The company plans to reorganize its organizational structure in the areas of information and communication. This reorganization is driven by changes in the competitive environment on the global market. Besides deregulation and privatization processes the main driver for this drastic step has been the convergence of technologies. With the reorganization of its information and communication divisions Siemens reacts to the growing importance of these businesses. According to the press release the company earned 40 per cent of its total turnover in these segments which was 30 Billion Dollars in 1997.<sup>1</sup>

As shown by the reaction of Siemens and other multinational companies in the information and communication industries, digital convergence significantly alters the way business is done. Consequently, traditional concepts of strategic management become largely obsolete. Rather, innovative approaches need to be pursued in order to gain and sustain a competitive edge in the increasingly heterogeneous and fluctuating environment of these converging industries.

In this paper we want to analyze the consequences of digital convergence on strategic management and its underlying assumptions. Additionally, we will introduce a hybrid strategy which considers possible implications of digital convergence.

## 2 Characteristics of Digital Convergence

In theory, the concept of digital convergence has been known for decades.<sup>2</sup> Scientists of various fields have predicted the coming of the digital revolution and tried to assess its implications on industry and society.<sup>3</sup> However, it was not until a few years ago that digital convergence started to gain practical importance.<sup>4</sup> At that time, large numbers of high-performance digital components were brought onto the market at relatively low costs which facilitated the rate of adoption of these

---

<sup>1</sup> Siemens [Press Release 1998], pp. 1, Neukirchen/Schneider [Interview 1998], p. 43.

<sup>2</sup> Messerschmitt [Convergence 1996], p. 1.

<sup>3</sup> Baldwin et al. [Convergence 1996], Yoffie [Competing 1997].

<sup>4</sup> Duysters/Hagedoorn [Convergence 1995], pp. 205.

technologies in a variety of different products.<sup>5</sup> Today, almost every single electronic device incorporates some sort of digital technology. Consequently, as these products were increasingly equipped with digital components, boundaries among distinct industry became ambiguous and lead to overlapping industries. The most vivid example is given by the information industry and the communications industry which now form one industry.<sup>6</sup>

Although extensively discussed in theory and practice, a clear definition of the term „convergence“ does not exist yet. A widely accepted definition of convergence has been suggested by Yoffie: „In its simplest form, convergence means the uniting of the functions of the computer, the telephone, and the television set.“<sup>7</sup> An alternative definition describes convergence as „the ability of different network platforms to carry essentially similar kinds of services.“<sup>8</sup> While the first definition is one most often cited in popular press - it is easily understood - does the second represent a more scientific approach toward this topic and, thus, is more frequently found in scientific publications. Finally, Wegberg distinguishes among convergence on the supply side and convergence on the demand side. „On the supply side, convergence means that ... industries increasingly use the same knowledge base. On the demand side, convergence means that market boundaries become fuzzier, both within the ... industries and between them.“<sup>9</sup>

Greenstein & Khanna suggest that there are two primary kinds of convergence: convergence in substitutes and convergence in complements.<sup>10</sup> According to the authors two products converge in substitutes when customers consider two products to be interchangeable with each other. This form of convergence occurs if different companies develop features of their products that make them similar to certain other products. It also appears, when companies develop standardized bundles of components to perform a certain range of functions, e.g. a company

---

<sup>5</sup> Duysters/Hagedoorn [Convergence 1997], p. 1.

<sup>6</sup> Chakravarthy [INFOCOM 1993], Chakravarthy [Commitments 1994], OECD [Convergence 1992].

<sup>7</sup> Yoffie [Competing 1997], pp. 3.

<sup>8</sup> European Commission [Convergence 1997], p. 1.

<sup>9</sup> Wegberg [Alliances 1995], pp. 4.

<sup>10</sup> Greenstein/Khanna [Convergence 1997], pp. 203.

merges a monitor, keyboard, central processing unit, and a telephone to form a complete communication system.<sup>11</sup>

Convergence in complements is when two products work better and more efficient together than separately. It occurs when different companies develop standardized products or systems that interact to form a larger system. In this case, the components perform a combined function which none of them could do alone. The combination of these technologies creates a service that did not exist before. Thus, the output of this system can potentially be larger than the sum of the outputs of its parts. In both cases, the products are often unrelated and start to converge in complements or substitutes over time. An example for convergence in complements is the recent large-scale emergence of online-databases. These products unify two formerly distinct technologies: advanced on-line transaction computing technology and data compression methods for telecommunication.<sup>12</sup>

The trend towards digital convergence is determined by several major driving forces.<sup>13</sup> Basically, the European Commission distinguishes among technology and deregulation.<sup>14</sup> Yoffie introduced three main driving forces: 1. semiconductor, software and digital communication technologies, 2. governmental deregulation, and 3. managerial creativity.<sup>15</sup> Some of these drivers have been well understood since the early Seventies. Especially, digital technology was assessed as a major driver towards convergence. However, according to Yoffie it required the joint effort of all the three driving forces in order for digital convergence to materialize.<sup>16</sup>

Undoubtedly, the most important of these driving forces is the rapid progress in the field of digital and related technologies. According to Moore's law - named after Intel Corporation's chairman Gordon Moore - power and capacity of micro processors double approximately every eighteen months.<sup>17</sup> Although the doubling cycle has now increased up to two years, the underlying principle of Moore's law is

---

<sup>11</sup> Greenstein/Khanna [Convergence 1997], pp. 203.

<sup>12</sup> Greenstein/Khanna [Convergence 1997], pp. 204.

<sup>13</sup> Messerschmitt [Future 1996], pp. 8.

<sup>14</sup> European Commission [Convergence 1997], pp. 1.

<sup>15</sup> Yoffie [Competing 1997], pp. 6.

<sup>16</sup> Yoffie [Competing 1997], pp. 8.

<sup>17</sup> Schaller [Implications 1996], Tapscott [Revolution 1996], pp. 126, Intel [Moore's Law 1998].



still valid: the costs of increasing computer power are decreasing, hence, approaching almost zero.<sup>18</sup> Together with improved software, this rapid progress in microelectronics allows computers to perform a growing range of functions at low costs. This has led to the spreading of computer availability to millions of corporate and private users around the world.<sup>19</sup> By 1997 about 25 per cent of German households use computers. Computer usage is even higher in the United States or Scandinavian countries where it approaches 40 to 50 per cent.<sup>20</sup>

Modest progress in the communication field hindered the movement towards convergence in the early stages. Traditional devices for information interchange (e.g. copper wires) had only limited capacity, which raised the costs of communication services. However, recently developed communication technologies (e.g. fiber-optic cables) overcome this major technological backlog by allowing the transmission of large quantities of information at relatively low costs.<sup>21</sup>

Yet, improvements in communication technologies alone cannot lead to a major decline in communication costs. Often, complicated regulatory schemes negatively influence the cost structures of communication service providers. In some cases they have created monopolies causing high communication costs. Thus, in addition to the advent of new technologies it also needed a process of deregulation which dramatically reduced telecommunication costs. This process was triggered by the breakup of AT&T in the United States in 1984.<sup>22</sup> Also the European telecommunication markets have moved from monopolized structures to markets facing full competition. By the beginning of 1998 telecommunication services and infrastructures will be totally liberalized in most member states of the EC. As a result, communication costs will ultimately continue to decline all over the world.

In his discussion of the major driving forces Yoffie stresses the importance of managerial creativity as a crucial factor to create convergence.<sup>23</sup> From 1970 to 1990 progress in computer and communication technologies did not lead to con-

---

<sup>18</sup> Schaller [Implications 1996], Fehr [Kreativität 1998].

<sup>19</sup> Yoffie [Competing 1997], p. 7.

<sup>20</sup> Fachverband Informationstechnik [Computerbranche 1997].

<sup>21</sup> Yoffie [Competing 1997], pp. 7.

<sup>22</sup> Yoffie [Competing 1997], p. 8.

<sup>23</sup> Yoffie [Competing 1997], pp. 9.

vergence, because it happened within established industry boundaries. Early attempts of creating convergence relied on conventional views of technology. Big global players like IBM and Sony tried to force convergence to happen by means of mergers, acquisitions and alliances. The main idea was to create innovative core competencies by merging complementary competencies through mutual learning processes.<sup>24</sup> However, these attempts to create convergence failed in most cases. On the other hand, small start-up companies have followed more unconventional ways to create innovative products for their niche markets in order to stay competitive against established players. Thus, managerial creativity from these start-ups was a major driver towards digital convergence.

### 3 Strategic Implications of Digital Convergence

#### 3.1 Implications on Industry Structure

Much has been published about strategic implications of digital convergence on industry structure.<sup>25</sup> Most of these publications focus on corporate activities within the well-defined boundaries of existing industries, rather than on what happens between industry boundaries.<sup>26</sup> Thus, in this paper, we follow an approach that incorporates both the inter-industrial and the intra-industrial implications of digital convergence. This approach is based on Porter's working definition of an industry „...as the group of firms producing products that are close substitutes for each other.“<sup>27</sup> It considers the fact that convergence causes formerly distinct industries to form a mega-industry which Chakravarthy calls „INFOCOM“<sup>28</sup>. The industry and its major players are illustrated by Figure 1.

---

<sup>24</sup> Hamel [Collaboration 1990].

<sup>25</sup> e.g. Collis et al. [Structure 1996].

<sup>26</sup> Greenstein/Khanna [Convergence 1997], pp. 201.

<sup>27</sup> Porter [Strategy 1998], p. 5.

<sup>28</sup> Chakravarthy [INFOCOM 1993], Chakravarthy [Commitments 1994].

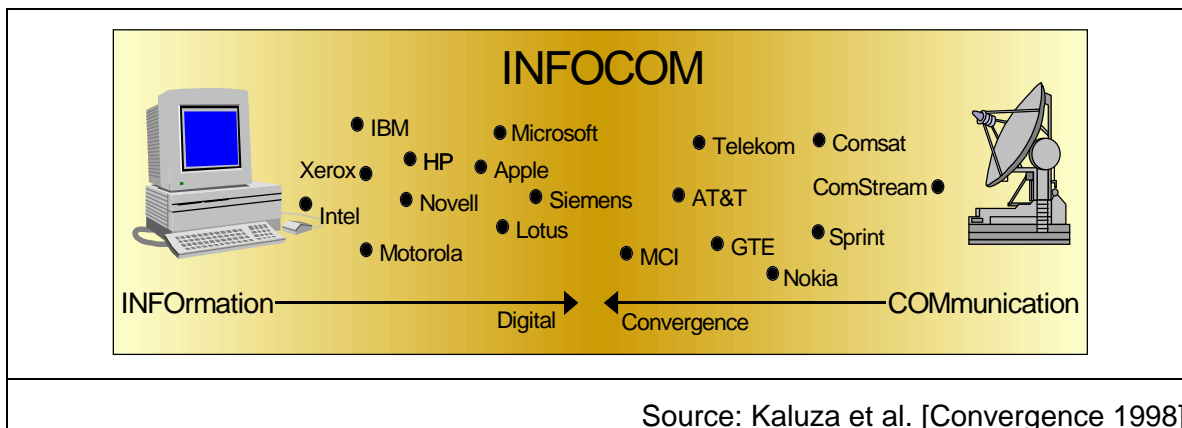


Figure 1: Digital Convergence and INFOCOM

To this industry we apply the concept of structural analysis of industries.<sup>29</sup> According to this concept, the intensity of competition in an industry is rooted in its underlying economic structure. This structure is expressed by five basic competitive forces which determine the ultimate profit potential of the respective industry. The five competitive forces are threat of new entrants, threat of substitutes, bargaining power of buyers, bargaining power of suppliers, and intensity of rivalry.<sup>30</sup> In this chapter we will examine emerging shifts in the major sources of each of these competitive forces in order to assess the strategic implications of digital convergence on industry structure.

New entrants can substantially threaten an industry's profitability as they bring new production capacity, try to gain market share and often dispose of substantial resources.<sup>31</sup> Thus, every industry tries to prevent new competitors from entering the market by erecting barriers to entry.<sup>32</sup> If these barriers are high, consequently, the threat of entry will be low. Generally, digital convergence leads to a reduction of barriers to entry by negatively affecting its major sources. Product differentiation is not an effective barrier anymore since products in the information and communication field are getting more and more homogenous and, hence, substitutable. Customers' costs for switching among products from different vendors are relatively low. Consequently, brand identification and customer loyalty are diminishing

<sup>29</sup> Porter [Strategy 1998], pp. 3.

<sup>30</sup> Porter [Strategy 1998], pp. 3.

<sup>31</sup> Porter [Strategy 1998], pp. 7.

<sup>32</sup> Yip [Barriers 1982].

entailing the risk of new entrants. This risk has become even more evident by the abrogation of government regulation of the telecommunication markets. Since government barriers were lifted a large number of phone and cable TV companies have entered these growing markets threatening the market positions of established competitors. Finally, know how differentiation - traditionally an effective barrier in technological industries - is beginning to deteriorate due to an increasing rate of technology transfers among these industries through mergers, acquisition, and alliances.

Intensity of rivalry derives from one or more competitors attempting to enhance the competitive position within the existing industry. In most cases, competitive actions have substantial effects on the other competitors and, hence, cause competitive reaction. If this vicious cycle of competitive action and reaction escalates, it can undermine the profitability of the whole industry.<sup>33</sup> The overall effect of digital convergence on rivalry among current competitors is supposed to be of an indifferent nature. It influences some sources of this competitive force in a favorable, others in an unfavorable way. The number of players in the information and communication industries has largely increased over the past years, due to lower barriers to entry and deregulation. This leads to numerous competitors in these industries. Additionally, more competitors also enlarge industry capacity often disrupting the supply/demand balance. Finally, as products in these industries become more and more substitutable, companies increasingly need to compete on price.

These factors increase the probability of offensive actions of some competitors in order to gain competitive advantages. As a result, the whole industry becomes unstable. The risk of ruinous price battles in the information and communication industries is somewhat lowered by the extraordinary growth these industries have been experiencing over the past few years. The actual worldwide volume of the information and communication market amounts to 1,5 Trillion Dollars with an estimated growth of 8,6 per cent for the next two years. Thus, every competitor can improve its market position by growing with the market and not at the expense of the others. Additionally, the process of convergence leads to an increasing number of mergers, acquisitions, and alliances<sup>34</sup> which reduces the intensity of rivalry.

---

<sup>33</sup> Porter [Strategy 1998], pp. 17.

<sup>34</sup> Wegberg [Alliances 1995], pp. 1.

According to statistics provided by the European Commission<sup>35</sup> more than 15 per cent of worldwide mergers and acquisitions took place in the information and communication industries. Thus, current players in these industries are trying to coordinate their strategies resulting in reduced rivalry among them.

Substitute products are other products that can perform the same functions as the products of the industry. Pressure from these products derives from their characteristic of placing a ceiling on prices companies can charge their customers without losing them to other industries and, hence, compromising the profitability of their own industry.<sup>36</sup> Digital convergence increases the pressure from substitute products for various reasons. Due to convergence, margins between distinct industries become fuzzier. Consequently, some previously unrelated products become direct substitutes in demand. Examples for this effect are fax machines and computers (the latter equipped with a modem and fax software) as well as television and multimedia computers.<sup>37</sup> Another reason for the emerging trend towards a higher substitutability of converging products is the increased similarity of these products in terms of physical appearance and features. Every new generation of digital products grabs more features from related products rendering them easily interchangeable for customers.<sup>38</sup>

Bargaining power of buyers may threaten an industry's profitability by forcing down prices, demanding higher quality or more services, and playing competitors against each other. The power of the major buyer groups of an industry depends on a number of market characteristics<sup>39</sup> which are influenced differently by digital convergence. In all, convergence will lead to an increase in the bargaining power of buyers of the concerned industries. One major cause is that converging information and communication products are relatively undifferentiated. This lack of differentiation provides buyers with a strong bargaining position as they can easily find alternative suppliers. Their position is enhanced by generally reduced switching costs due to the high standardization of information and communication technologies. In this situation the price becomes the primary determinant of buying

---

<sup>35</sup> European Commission [Convergence 1997], p. 6.

<sup>36</sup> Porter [Strategy 1998], pp. 23.

<sup>37</sup> Wegberg [Alliances 1995], p. 5.

<sup>38</sup> Yoffie [Competing 1997], p. 7.

<sup>39</sup> Porter [Strategy 1998], pp. 24.

patterns. Customers tend to be very price-sensitive weakening the profitability of the respective industries.

Additionally, converging products incorporate a growing number of features which were originally provided by a large number of distinct products. For instance, modern computers already envelop adjacent businesses, from calculators to answering machines, from digital video and audio to faxes. As a large variety of needs is served by one convergent product,<sup>40</sup> it is easier for buyers to gather and process market information on this single product rather than on multiple products. This higher information level usually yields a higher bargaining power to the buyer.<sup>41</sup> Finally, the bargaining power of buyers is enhanced by the growing number of competitors in these converging industries due to deregulation. The overall trend towards raised bargaining power of buyers is somewhat weakened by the fragmented structure on the demand side of the market. Predominantly, buyers only represent small portions of total sales of the industry, which reduces the influence of single buyer groups on the industry's profitability.

Bargaining power of suppliers can be exerted by threatening to raise prices or reduce the quality of an industry's input factor. In this way suppliers can substantially reduce the profitability of an industry.<sup>42</sup> Digital convergence is to a large extent based on semiconductor and other types of digital technology. There is literally no electronic appliance anymore that doesn't incorporate some sort of microchip. Hence, semiconductors and microchips are an important input to the products of INFOCOM. They largely influence the strategic options companies in this industry may pursue. This characteristic raises the bargaining power of suppliers. Additionally, the supplier group for this type of input factors is dominated by a few companies like Intel, Motorola, Siemens, Cyrix, and so forth. These suppliers are able to exert considerable pressure on the industry in form of availability, prices, and quality of these crucial inputs. A similar concentration exists in the software market where Microsoft has built a dominant position over the past 10 years and doesn't hesitate to actively use the bargaining power coming along with that position.

---

<sup>40</sup> Yoffie [Competing 1997], pp. 5.

<sup>41</sup> Porter [Strategy 1998], p. 26.

<sup>42</sup> Porter [Strategy 1998], pp. 27.

The ongoing trend towards mergers, acquisitions and alliances will have positive and negative effects on supplier power. On the supply side it will raise the level of concentration of important supplier groups leading to an improved bargaining position over their buyers in the information and communication industries. On the demand side it will reduce the fragmentation of buyers and, hence, reduce the bargaining power of suppliers. Consequently, the overall impact of concentration on suppliers' power depends on the ratio of the relative changes in concentration on those two sides. This competitive force is further weakened by the large equality of digital components that make them relatively substitutable. Additionally, the INFOCOM industry represents a significant fraction of the total sales of these suppliers and, therefore, is an important and powerful customer. In summary, the impact of digital convergence on suppliers' bargaining power is indifferent, as strengthening and weakening forces tend to cancel each other in most cases.

The collective strength of these five competitive forces determines the intensity of competition within an industry and, hence, its profitability.<sup>43</sup> Due to digital convergence three competitive forces are supposed to increase while two others are affected indifferently. This development is illustrated in detail by Figure 2.

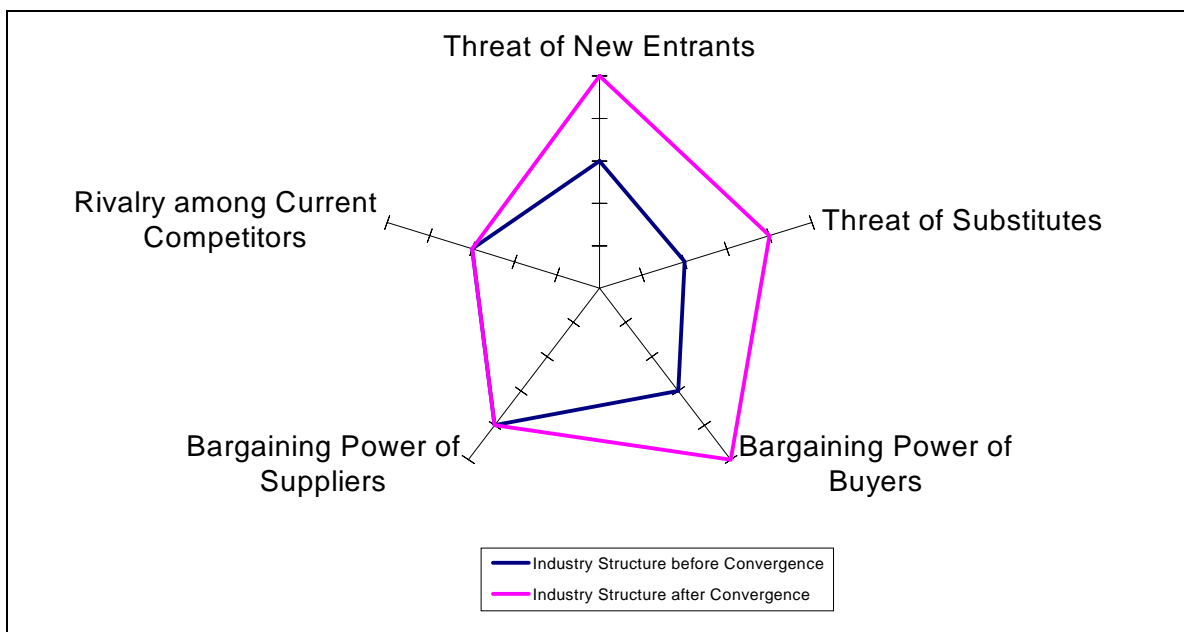


Figure 2: Changes in Industry Structure due to Digital Convergence

<sup>43</sup> Porter [Strategy 1998], pp. 5.

This shift in the strengths of some forces leads to an overall increase of competition in the information and communication industries. The fundamental paradigm of the theory of industrial organization is the „structure-conduct-performance-paradigm“.<sup>44</sup> Following this paradigm we may infer that the profitability of the industry will decline because of the accelerating trend towards digital convergence. This severe competitive environment requires new critical success factors and alternative forms of strategic behavior.

### 3.2 Implications on Critical Success Factors

Critical success factors are defined as factors that enable companies to gain a competitive edge over their competitors. Thus, critical success factors largely determine a company's long term prosperity and growth. What kind of factors are critical for strategic success has not been clearly defined yet. This is mainly due to conceptual deficiencies of research in this area. Still, there is a large degree of consent regarding costs, quality, flexibility, time, product variety, and service of being critical success factors.<sup>45</sup> Exploiting these critical success factors creates strategic advantages for the respective company for a certain period of time. Thus, a company needs to have at least one of these critical success factors in order to survive in today's competition.<sup>46</sup>

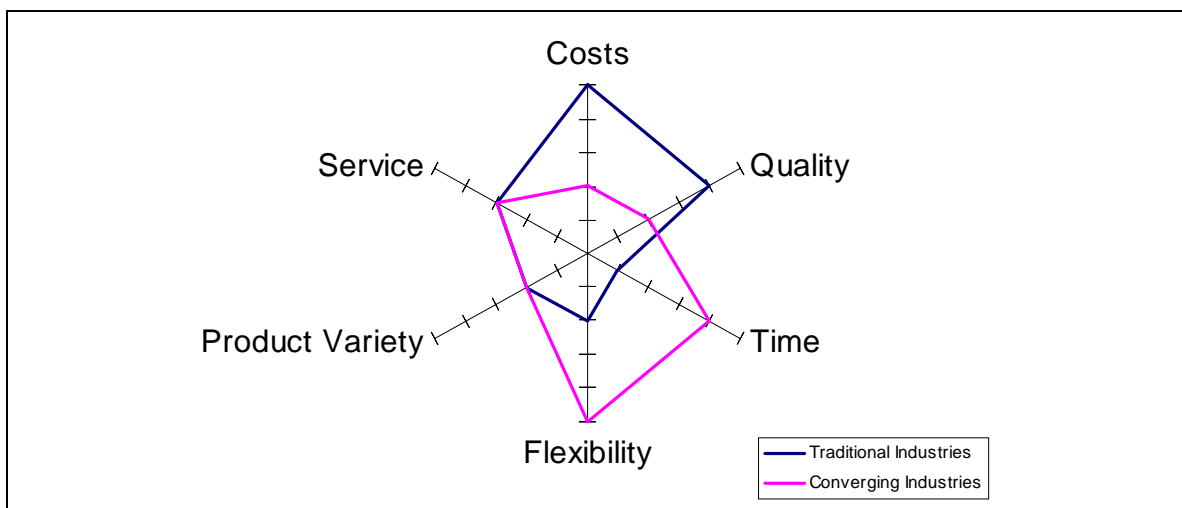


Figure 3: Implied Changes on the Strategic Importance of Critical Success Factors

<sup>44</sup> Mason [Monopoly 1939], pp. 34, Caves [Industry 1964].

<sup>45</sup> Kaluza [Erzeugniswechsel 1987], Kaluza [Erzeugniswechsel 1989].

<sup>46</sup> Henderson [Erfahrungskurve 1984].



As shown by Figure 3 the ongoing process of converging products and industries significantly alters the strategic importance of four of these critical success factors (costs, quality, flexibility and time) while two others (product variety and service) are largely unaffected. Those changed are influenced in two different ways: directly and indirectly. Directly, digital convergence implies an alteration of the strategic effectiveness of these critical success factors for gaining a competitive advantage. Indirectly, it causes changes in the competitive environment influencing companies' critical success factors. Thus, digital convergence exerts significant pressure on companies to reconsider their competitive position and the critical success factors it is based upon.

Since the early Seventies costs have been considered as a crucial factor for long-term success and prosperity.<sup>47</sup> Although some other major critical success factors have been discovered since then, costs are still of major importance to strategic management. As a result, most modern strategies incorporate costs as a critical success factor although to a different extent. In converging industries, however, the relative importance of costs has decreased. Industries now growing together were originally separated. They had followed different historical paths resulting in industry-specific cost structures. These differences in cost structures allowed a clear distinction of industries and their boundaries and represented a barrier to entry for new competitors. However, due to digital convergence cost structures of the industries involved have become more and more similar. This effect is due to the technological adjustments in converging industries. The information industry and the communication industry are extensively using microelectronics and digital components as major input factors. As these components are largely standardized, companies of both industries incur nearly the same purchasing costs. Additionally, the same production equipment is required to assemble these components. As a result, also production costs become similar. The tendency of the decreasing importance of costs as a critical success factor is enforced by the steady decline in unit costs of computer power. Due to rapid progress in the microelectronics field computer power has become virtually free.<sup>48</sup> Consequently, in related industries it becomes extremely difficult to gain competitive advantage on the basis of low costs for core components.

---

<sup>47</sup> Wildemann [Fabrik 1989], p. 7, Porter [Strategy 1998], p. 35.

<sup>48</sup> Yoffie [Competing 1997], p. 7.

However, in many cases the decrease in costs for this type of input is partly offset by a significant increase in costs for acquiring know-how. In order to stay competitive in INFOCOM, companies need to acquire know-how from other industries they haven't been in so far. Companies from the information industry need to achieve communication expertise and vice versa. Generally, getting access to immaterial resources like know-how requires substantial investments over a long period of time. Many companies try to lower this cost burden by building strategic alliances or other forms of cooperation, which again leads to an adjustment of the cost structures of the companies involved.

Another effect reducing the strategic relevance of costs is the modified experience curve as described in Figure 4. Due to convergence, technological leaps become more frequent. As a result, cost advantages deriving from the traditional experience curve become partially obsolete. Rather, companies move to a new experience curve that includes the old as well as the new technologies and functions. This shift from one experience curve to another requires companies to develop a new cost decreasing potential by moving along the new experience curve. Simultaneously, all competitors are placed in a similar starting position. Therefore, it becomes extremely difficult for one of these companies to gain new cost advantages over its competitors.

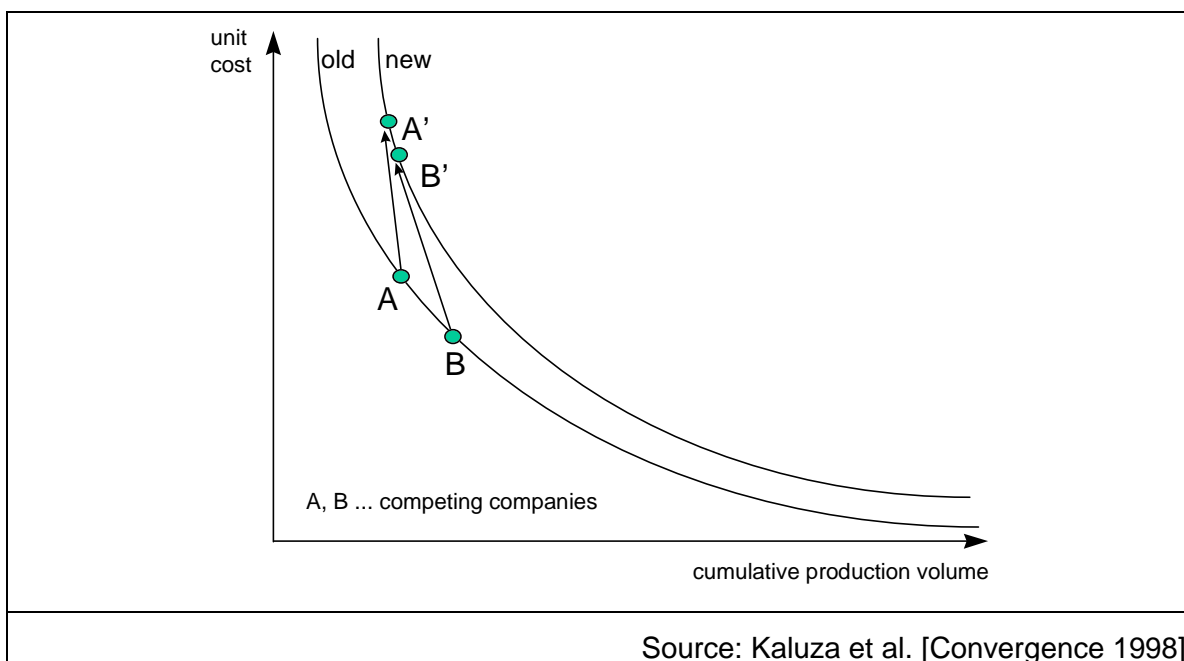


Figure 4: Modified Experience Curve Effect

A second major critical success factor is quality. Generally, quality is defined as the degree of customer satisfaction provided by a product or service. Quality con-

sists of two major sources: conceptual quality and production quality. Conceptual quality describes to what extent customer needs are taken into consideration in the conceptual and designing phase of a product or service. Production quality is defined as the transfer of conceptual quality into product quality.<sup>49</sup> Based on our definition of quality as the degree of customer satisfaction we may identify two major implications of digital convergence on quality as a critical success factor.

The first implication derives from the increased range of functions provided by products of converging industries. For instance, convergence among the computer industry and the entertainment business leads to the emergence of multimedia computers on a large scale. Today almost every computer shipped in the world has multimedia capabilities while in 1992 only 1 percent could provide these features.<sup>50</sup> This substantially increased range of different functions provided by a single product allows to satisfy various types of customer needs simultaneously, thus, raising the degree of quality. In many cases these products also provide functions that directly result from the process of merging different technologies and know-how. This, again, increases the quality of the products concerned. From these effects we can infer, that the process of digital convergence leads to an industry-wide increase in quality by providing customers with an extended range of different and partly unique features.

The second implication of digital convergence on quality deals with the process of standardization in the industries involved. As already mentioned, INFOCOM relies heavily on microelectronics and digital components as core input factors. These factors are characterized by a high degree of standardization. As everyone uses the same standardized input, a certain minimum quality level becomes implicitly defined throughout the whole industry. Usually, this minimum quality level is relatively high. Therefore, it becomes very difficult to compete solely on the basis of quality. Due to these two major implications of digital convergence, quality is reduced from a critical success factor to a hygiene factor. A high level of quality needs to be maintained for staying competitive, however, it cannot be used as the only source for gaining a competitive edge in the INFOCOM industry.

---

<sup>49</sup> Kaluza et al. [Telekommunikationstechnologien 1996], p. 40.

<sup>50</sup> Yoffie [Competing 1997], p. 7.

The third significantly affected critical success factor is flexibility. In general, flexibility is an important characteristic of companies enabling them to quickly adopt to changes in their environment. In particular, it is a crucial factor for companies operating in an economic environment like INFOCOM which has become more and more complex, dynamic, and unpredictable recently. In this case, flexibility significantly increases the probability of survival and long-term economic success. Generally, we can state that the importance of flexibility as a major critical success factor is enhanced due to the process of digital convergence for two major reasons: first, an increased demand for flexibility and second, a higher potential of flexibility within converging industries. In the following discussion of flexibility and convergence we distinguish among organizational and technological flexibility.

As previously mentioned, digital convergence implies an increase in the range of products, markets, and competing companies. These implications require a high level of technological flexibility. Converging industries entail the merger of different technologies. Companies, therefore, need to get acquainted with these new technologies and have to incorporate them into their existing technological production environment. Bundling established and new technologies requires at least a minimum degree of compatibility among them. Finally, companies also need to have flexible input factors in order to meet an increased variety of customer needs in the INFOCOM industry.

In addition to technological flexibility we identified an increased demand for organizational flexibility. Changes in the technological environment require complementary know-how which integration into the existing organization represents a major challenge. Often this integration process involves changes in the organizational structure and processes. In summary, on the one hand the demand for flexibility increases due to convergence. On the other hand, convergence provides companies with a high potential of flexibility. Modern computer-integrated production technologies are capable of producing a wide range of products with only a minimal amount of physical setups. Furthermore, products of INFOCOM are of a digital and modular nature. They can easily be varied by adding/removing components or changing their programming. A widely seen consequence of digital convergence is a growing number of mergers and alliances. These forms of inter-organizational cooperation aim at the mutual interchange of intangible resources like know-how. Thus, they increase the potential of organizational flexibility of the companies involved. From these implications on flexibility we infer that rather than costs and quality, the importance of flexibility as a critical success factor is en-

hanced due to digital convergence. Thus, an active management of flexibility becomes crucial for a company's long-term success in the INFOCOM industry.

Finally, we want to analyze how time as a critical success factor is affected by digital convergence. In today's competition time becomes increasingly important. This shift in importance is mainly due to the contradictory development of the two major components of time companies of every industry have to deal with: time to market and time on the market. While the time until products are ready for being brought to the market has significantly increased over the past decades, their average time of presence on the market has shortened dramatically. This development requires companies to view and actively manage time as a critical success factor.

Due to digital convergence, the already substantial gap between time to market and time on the market has further increased. In both, the information industry and the communication industry innovations are of major strategic importance resulting in very short innovation cycles. This phenomenon particularly applies to the information industry. As these industries converge their innovation cycles overlap forming a new cycle with an extremely short meantime between innovations. Thus, the pace at which existing products and technologies are continually replaced by innovate ones is ever increasing, significantly reducing the time products are exposed to customers on the market. If this replacement rate exceeds a certain level a phenomenon emerges which is called „leap frogging“. This terminus describes a special form of consumer behavior often observed in high-technology industries: consumers do not follow each and every technological leap but start to leave out one or even two leaps before they switch to an innovative product. However, this behavior is not appropriate for companies operating in this business. As patterns of leap frogging differ from customer to customer, companies are forced to follow every technological leap of the industry.

The strategic position of INFOCOM companies is aggravated by the fact that time and costs for research and development are mostly unaffected by convergence and, hence, continue to increase. In this severe economic environment the management of time - in the meaning of the ability to pioneer the market with new products or services - becomes crucial. It puts a company in the favorable position of being able to provide customer with solutions that incorporate the latest state of engineering. Thus, fast reactions to shifts in customer needs and technological advancements allow a company to realize economies of speed, as customers are willing to honor fast reactions with higher prices. Furthermore, being the first on

the market with an innovative product creates a temporary monopoly. In this market situation the pioneering company is relatively free to set adequate prices in order to recover the usually considerable costs for research and development. Once other companies come up with similar products prices drop immediately, due to the increased competition. In this situation, it becomes much more difficult to amortize investments in research and development. Finally, being innovative creates a positive image among customers and, therefore, strengthens the competitive position of a company in the marketplace.

While the previously discussed implications of digital convergence on major critical success factors were of a direct nature, we now want to give a brief outline of its indirect implications. Basically, these indirect implications result from an alteration of the competitive forces in an industry (refer to chapter 3.1) and, therefore, of the economic situation and profitability of the industry as a whole. According to Porter's model<sup>51</sup>, increased bargaining power of suppliers observed in INFOCOM leads to increased costs for major input factors, exerting heavy pressure on the critical success factor costs. The also enhanced bargaining power of customers requires companies to consider customer needs to a larger extent. Therefore, they need to have a relatively high minimum level regarding the critical success factors costs, quality, flexibility, and time. Basically, the same effect derives from the increased rivalry of existing competitors within the INFOCOM industry. The severe competitive situation is even enhanced as the higher probability of new entrants increases the demand for low costs, flexibility, and economies of time. Finally, digital convergence implies an increased threat of substitutes. Thus, companies need to improve their cost and quality position in order to stay competitive.

In the previous paragraphs we showed that digital convergence triggers direct and indirect shifts in the strategic importance of major critical success factors. While costs and quality experience a major decrease in strategic importance, that of flexibility and time is substantially enhanced. This, again, has significant consequences on Porter's widely used generic strategies.

---

<sup>51</sup> Porter [Strategy 1998], pp. 27.

### 3.3 Implications on Generic Strategies

With his concept of the generic strategies Porter suggested three fundamentally different routes to sustainable competitive advantage which have gained widespread acceptance over the past twenty years. The cost leadership and differentiation strategies aim at a competitive advantage in the whole industry. Focus strategies, however, seek to achieve a cost advantage or differentiation advantage in a narrow segment of the market. The underlying notion of this concept is that companies in order to gain competitive advantage, are required to make a clear choice about the path towards this competitive advantage. Otherwise, they risk to be caught in a position which Porter calls „stuck in the middle“<sup>52</sup>, characterized by below average performance and low profitability.

Overall cost leadership aims at gaining a considerable cost advantage within the industry. It became widely used in the Seventies, when the experience curve concept was popular. Successfully pursuing this strategy requires aggressive construction of efficient-scale facilities, realizing cost reductions from the experience curve concept, tight cost and overhead control, avoidance of marginal customers, and consequent cost minimization in indirect areas like R&D, marketing, finance, and so forth.<sup>53</sup> Low costs become the main goal where every major decision is verified upon. Still, other major critical success factors and other functional areas cannot be totally ignored, but are considered at a minimum level. Consequently, the competitive edge deriving from this strategy is the ability to offer products at prices that go beyond those of competitors. A cost leader can acquire a substantial market share and, hence, a dominant position in the industry. However, this strategy is highly susceptible to technological leaps which nullify advantages from the experience curve. Furthermore, it requires one company to be the cost leader, not several firms vying for this position.<sup>54</sup> Additionally, cost leadership can only be achieved in a market for homogeneous products, where the price represents the main purchasing criteria.

These prerequisites of the overall cost leadership strategy are largely undermined by the process of digital convergence. At a first glance, it may be easier to achieve a large absolute market share in a mega-industry like INFOCOM with a substantial

---

<sup>52</sup> Porter [Advantage 1998], p. 12, pp. 16.

<sup>53</sup> Porter [Strategy 1998], p. 35.

<sup>54</sup> Porter [Advantage 1998], pp. 13.

market volume. However, this most important prerequisite for cost leadership becomes rather difficult to gain due to the also increased number of competitors in this industry and the higher threat of new entrants from adjacent industries. Gaining strategic cost advantages by implementing innovative production technologies cannot be considered to be effective anymore as usually a large number of competitors has access to them because of the high degree of intra- and inter-industrial cooperation observed in the INFOCOM industry. This development also heavily influences the strategic implications from the experience curve concept. Not only, this concept becomes largely obsolete for strategic management due to frequent leaps from one experience curve to another, canceling already gained cost advantages. But also, it puts all competitors in a similar or even equal position on the new experience curve, thus rendering it very difficult to gain a leading position. Additionally, digital convergence causes another inherent risk of cost leadership to materialize. Homogenous markets and products do not exist in the INFOCOM industry anymore. Rather, products are to an increasing extent differentiated in order to satisfy a wide range of customer needs. As a result, they become more and more heterogeneous in terms of product technologies but also production technologies. In this situation, cost-effective large-scale production of a homogenous product designed for mass markets does not represent a strategic option anymore.

Another effect coming along with highly differentiated products is the reduced importance of prices as a purchasing criteria. As differentiated products serve an increasing range of needs, customers are willing to value this increased customer focus by paying higher prices. Thus, prices are not the main purchasing criteria anymore, but are devalued to a hygiene factor which has only marginal influence on customer behavior, as long as it remains within a certain bandwidth. This deteriorated impact of prices on purchasing patterns significantly weakens the position of a company pursuing a cost leadership strategy. The last statement is significant for the overall implications of digital convergence on this generic strategy and, thus, directly leads over to the conclusion we may draw from our analysis: Porter's generic strategy of overall cost leadership is largely undermined by digital convergence. This is due to the fact, that the critical success factor, this strategy is solely based upon experiences heavy pressure from the changes in converging industries. Basically, Porter's one-dimensional „cookbook approach“ towards cost leadership worked well in mass markets with homogenous products and clearly defined industry boundaries. However, its strategic validity becomes highly questionable in a multi-dimensional economic environment where strategic success cannot



be gained by solely focusing on one critical success factor but requires more factors to be taken into consideration simultaneously.

Porter's alternative generic strategy to long-term economic success is differentiation. According to this strategy, a company needs to differentiate its products or services in order to create something that is perceived as being unique by customers throughout the whole industry. Approaches towards creating such a unique position may be design or brand image, technology, features, customer service, dealer network, or other dimensions. By providing customers with unique benefits that go beyond a product's base functions a company can create customer loyalty. It provides insulation against competitive rivalry and significantly lowers customers' price sensitivity. Thus, differentiation yields higher margins avoiding the need for a low-cost position and establishing entry barriers.<sup>55</sup> A firm that can achieve and sustain a certain degree of differentiation will perform above average in its industry, as long as the price premium exceeds the extra costs incurred for differentiating its products.<sup>56</sup> Differentiation can be pursued successfully with high-quality products or products that address specific customer needs. It usually precludes gaining a high market share, as it requires a perception of exclusivity, which is incompatible with a high market share. It also incorporates a trade-off with a low-cost position as it requires costly investments in extensive research, product design, high quality materials and marketing campaigns. There is wide consent that this high-cost position represents the Achilles' heel of the differentiation strategy. Other inherent risks are imitating products launched by competitors, high fluctuations in customer needs, decreasing demand for the differentiated factors of a product, and too high increases in costs. Because of the latter risk a company pursuing this strategy cannot totally ignore its cost position, but needs to reduce costs in all areas that do not affect its differentiated position.<sup>57</sup>

Similar to a cost leader also a differentiator experiences significant strategic consequences due to alterations of the strategy's underlying factors and variables by digital convergence. As mentioned before, the differentiation strategy aims at creating uniqueness by providing high quality, service, and being responsive to customer needs. The potential of quality to create something that is perceived unique

---

<sup>55</sup> Porter [Strategy 1998], p. 38.

<sup>56</sup> Porter [Advantage 1998], p. 14.

<sup>57</sup> Porter [Advantage 1998], p. 14.

throughout the industry is increasingly deteriorating in converging industries. Both, the information and the communication industry are highly standardized in terms of input factors and production technologies. This results in an industry-wide high level of quality, which makes it almost impossible for a company to distinguish itself from competitors. Customers consider this high quality level of being a matter of course rather than something exclusive and are not willing to pay a premium price for it. They tend to react negatively, if a product's quality goes below the implicit standard quality level of the industry. Therefore, high quality only represents a hygiene factor that needs to be provided in order to stay competitive, but is no guarantor for above-average returns anymore.

Similar implications emerge for the second critical success factor of differentiation: service. Providing customers with a special service is an increasingly applied approach in converging industries with raising competitive rivalry. In this way companies with an unfavorable cost structure try to create customer loyalty which insulates them against ruinous price-fights. However, the more firms follow this approach, the less effective special customer service becomes as a source of differentiation. Rather, it becomes a must to survive in a converging environment. At a first glance, an effective factor of differentiation in INFOCOM seems to be responsiveness to customer needs by offering a wide range of product variances. This may be inferred from the high degree of standardization that characterizes this newly formed industry. However, standardization mainly of input factors and components comes along with an industry-wide concept of modular assembly of these components. Together with an easily adaptable software, this concept enables companies to offer an almost endless number of variances of a product. Consequently, products in INFOCOM are usually highly customized to the needs of particular customers. Additionally, all competitors have access to these standardized input factors, increasing the probability of imitations of a unique product. Therefore, gaining a differentiation advantage becomes very unlikely and cannot be sustained over a longer period of time. The last statement becomes even more important if we consider the significantly increased fluctuations in customer needs and preferences observed during the last few years. Finally, due to the improved technical possibilities for differentiation, every company in INFOCOM is theoretically capable of providing customers with multiple additional benefits. This leads directly to a further splitting of already existing customer groups. The resulting high level of market segmentation is another reason why it becomes nearly impossible for a company to uniquely position itself in the whole INFOCOM industry.

Focus is a generic strategy that concentrates a company’s efforts on a particular buyer group, segment of the product line, or geographic market. In contrast to overall cost leadership and overall differentiation, the focus strategy aims at serving a particular, narrow-defined target group very well. This focus enables a company to act more effectively or efficiently than competitors operating in the broad market. Companies pursuing this strategy gain a competitive edge by either better meeting the needs of the particular target market, or lower costs in serving this market, or even both. As a result, they may potentially earn above-average returns.<sup>58</sup> In view of digital convergence the major drawback of this strategy is that it is highly vulnerable to changes in the market structure, that is, an increasing degree of segmentation. Once market segmentation exceeds a certain level, the resulting strategic targets for focus become too narrow to be served in an economic way. In this case, focus is able to provide neither above-average returns nor defenses against the competitive forces.

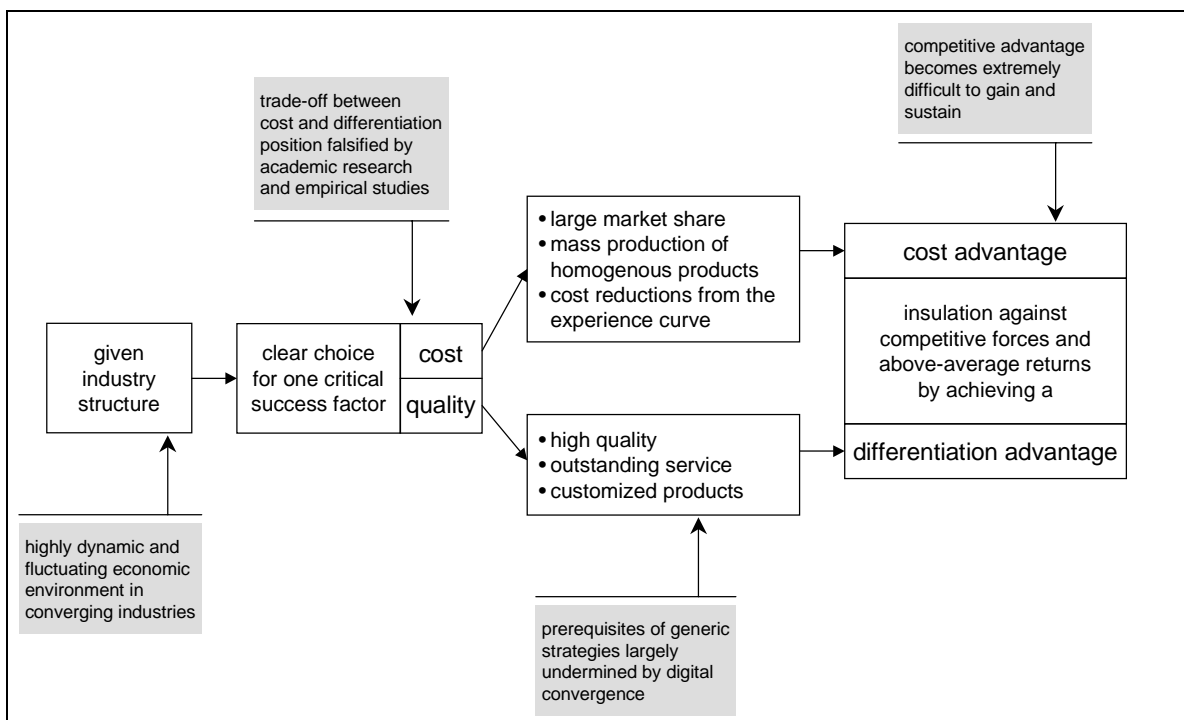


Figure 5: Consequences of Digital Convergence on Generic Strategies

Figure 5 summarizes the major drawbacks of Porter’s generic strategies if applied to converging industries. It shows that the author’s chain of cause and effect to-

<sup>58</sup> Porter [Strategy 1998], pp. 38.

wards strategic success is broken four times due to digital convergence. Therefore, its relevance for the respective industries may be doubted.

This criticism especially applies to Porter's core paradigm of the trade-off between a low-cost position and differentiation. In many cases this strict separation of cost leadership and differentiation has been falsified by academic research and empirical studies. For this reason, in a recent article, Porter tries to justify his concept by introducing a „productivity frontier“.<sup>59</sup> This frontier is defined as „...the sum of all existing best practices at any given time“<sup>60</sup>. Below this frontier, it is now possible for a company to improve its cost and differentiation position simultaneously. However, along this frontier, the trade-off between these two positions still exists. Improving the cost position can only be effected to the debit of the differentiation position and vice versa. This productivity frontier is shifted upwards by new technologies, enlarging the „hybrid area“ below the frontier. In contrast to Porter<sup>61</sup>, we do not expect this productivity margin to be shifted but altered in its shape. Additionally, the emerging of new technologies and digital convergence defines a new framework for strategic management as it significantly alters its underlying assumptions and variables. These actual trends are not yet included in Porter's concept of generic strategies. However, they provide companies with a high potential to perform above-average by pursuing hybrid strategies.

## **4 The Dynamic Product Differentiation Strategy as Strategic Response to Digital Convergence**

### **4.1 The Concept of Dynamic Product Differentiation**

In 1987 Bernd Kaluza introduced the concept of the Dynamic Product Differentiation Strategy. It is designed as the strategic response to today's heavily fluctuating markets and customer needs. This strategy stresses the notion of high flexibility companies need to achieve and maintain in order to adopt immediately to those fluctuations over time. Thus, unlike many other approaches to strategic management, the Dynamic Product Differentiation Strategy is of a dynamic rather than static nature.

---

<sup>59</sup> Porter [Strategy 1996], pp. 62.

<sup>60</sup> Porter [Strategy 1996], p. 62.

<sup>61</sup> Porter [Strategy 1996], p. 78.

Originally, the Dynamic Product Differentiation Strategy derived from the concept of the three generic strategies. This concept — developed by Michael E. Porter — has significantly influenced the field of strategic management over the past two decades. In his concept, Porter distinguishes three basic strategies that are highly correlated with long term success: cost leadership, differentiation, and focus. The strategic implication from this concept is the strict separation between cost advantage and differentiation advantage. According to Porter, companies need to make a clear decision whether to pursue a strategy of cost leadership or a differentiation strategy. If they fail to do so, they risk to be moved into a strategically unfavorable situation which Porter calls „stuck in the middle“.

Although widely accepted in the academic world and extensively applied in the economic field, the three generic strategies suffer from three major conceptual drawbacks. These drawbacks have caused an increasing amount of criticism especially in the last few years.

1. Porter's generic strategies are of a static nature. They focus on achieving a high level of differentiation or a favorable cost position at one certain point in time. They do not consider possible changes in this positions over time. However, in reality these strategic positions are repeatedly redefined by the markets and, hence, highly dynamic. In his paper „Towards a Dynamic Theory of Strategy“<sup>62</sup> Porter tries to overcome this conceptual lack of its generic strategies.
2. The core paradigm of Porter's concept has been falsified by a series of empirical investigations<sup>63</sup>. They proved that successful companies gain a competitive edge over their competitors by improving both, their cost and differentiation position.
3. The generic strategies do not account for the strategic implications of modern manufacturing technologies and concepts as well as information and communication technologies.<sup>64</sup> However, these new concepts allow companies to simultaneously increase their flexibility and to lower their manufacturing costs. Thus, implementing modern manufacturing technologies accompanied by organiza-

---

<sup>62</sup> Porter [Theory 1991], pp. 95.

<sup>63</sup> e.g. Hall [Strategies 1980], pp. 75, White [Strategies 1986], pp. 217, Miller/Friesen [Strategies 1986], pp. 37.

<sup>64</sup> Kaluza et al. [Telekommunikationstechnologien 1996].

tional concepts is a common way to improve a company’s strategic position in both dimensions.

Kaluza’s Dynamic Product Differentiation Strategy allows to overcome the drawbacks of Porter’s generic strategies. This strategy focuses on four critical success factors: costs, differentiation, flexibility, and time. These critical success factors provide a company with the capability to meet changes in customer needs at low costs over a prolonged period of time. Figure 6 illustrates that a company pursuing the Dynamic Product Differentiation Strategy will try to achieve a cost advantage and a differentiation advantage simultaneously.

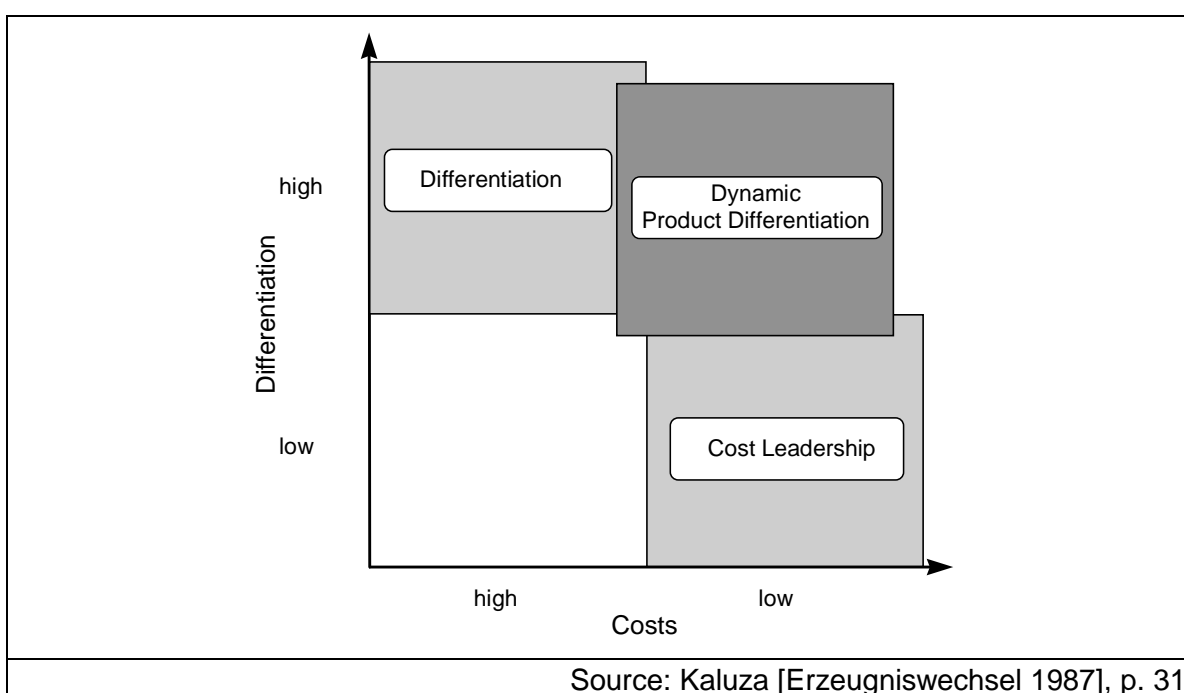


Figure 6: Dynamic Product Differentiation Strategy

Achieving this favorable strategic position in the upper right quadrant is effected by simultaneously focusing on the four major critical success factors. Together, they provide a company with the potential to react to changes in customers needs in a costly, fast and high-quality manner.

Flexibility is the core factor. The Dynamic Product Differentiation Strategy focuses on improving the process of switching from one product to another according to changes in customer needs. This flexibility can be achieved by using flexible technologies in the production area as well as in any other functional area of a company. Generally, these technologies have the potential to substantially increase the pace of the change process.

Time is the second major critical success factor. In today's dynamic economic environment customer needs are often highly volatile. Thus, for successfully pursuing the Dynamic Product Differentiation Strategy, fast reaction to major shifts on the demand side of the market becomes crucial. The resulting time advantages provide differentiation that is rather difficult to imitate and provides above-average returns.

Low costs are still of major importance for a Dynamic Product Differentiator. However, in this case cost reductions cannot be gained by following the path on the tradition experience curve. Rather, costs are reduced by realizing a so-called „learning-curve of change“<sup>65</sup>.

Today, customers expect to be provided with solution to their individual problems rather than generic products. Therefore, according to Kaluza, differentiation is provided not only by high product quality, but also by high service quality, a large variety of products, tailored solutions for individual customers, and a high pace of change.

## 4.2 Effectiveness of Dynamic Product Differentiation in Converging Industries

In chapter 3 we showed the limitations Porter's generic strategies encounter in the dynamic environment of converging industries. These limitations lead to a significantly lowered probability of success of these strategies. In our opinion, there are two reasons for this phenomenon. The first reason is Porter's postulated trade-off between a low-cost position and differentiation. This restriction significantly hinders companies in being successful in a market that requires them to be effective and efficient in both dimensions. The second reason is that Porter's generic strategies are relatively static concepts. They do not represent an adequate concept for the dynamic and often highly fluctuating economic environment of converging industries. These two major drawbacks require companies in the INFO-COM industry to search for alternative approaches to strategic management.

The most promising approach is to pursue hybrid strategies. The term „hybrid“ originates from the Greek language meaning „putting different things together“ or „coming from crossbreeding“. In this sense, hybrid strategies aim at gaining a

---

<sup>65</sup> Wildemann [Investitionsplanung 1986], pp. 1.

competitive edge by achieving both a low-cost position and differentiation<sup>66</sup>. Thus, these strategies do not consider Porter's „stuck in the middle“ position of being unprofitable. Rather, they stress the notion of a high profitability associated with this position. The strategic implications from this view make hybrid strategies to be applied with outstanding performance in converging industries. Typical hybrid strategies are the Outpacing Strategies<sup>67</sup>, the Mass Customization<sup>68</sup>, and the Dynamic Product Differentiation Strategy<sup>69</sup>. While the Outpacing Strategies and the Mass Customization aim at gaining a competitive edge by improving the cost position and the differentiation position sequentially, the Dynamic Product Differentiation Strategy calls for improving both positions simultaneously. Thus, it entirely condemns Porter's trade-off between a low-cost position and differentiation.

The Dynamic Product Differentiation Strategy emphasizes the notion of achieving long-term success by simultaneously focusing on a broad range of critical success factors rather than striving either for cost-leadership or differentiation. Thus, it is especially tailored for complex and dynamic industries like the information and the communication industries. In these industries companies are required to respond to changes in customer needs in a fast and cost-effective manner by still providing a high level of quality. The core functional area for achieving the necessary amount of flexibility is the production/operations area. According to Kaluza, this flexibility can only be achieved by exploiting the potential of modern production technologies as well as information and communication technologies on the shop floor and in adjacent areas. It also requires modern approaches to leadership and production/operations management to convert this potential into strategic success based on four critical success factors: flexibility, time, low costs, and differentiation.

In fluctuating industries like INFOCOM the main critical factors are flexibility and time. Traditional factors like low costs and differentiation are of minor importance to long-term success. However, the Dynamic Product Differentiation Strategy deviates from the traditional interpretation of the latter two success factors as it views

---

<sup>66</sup> Fleck [Wettbewerbsstrategie 1995], p. 2.

<sup>67</sup> Gilbert/Strebel [Strategies 1987], pp. 28, Gilbert/Strebel [Advantage 1991], pp. 82, Kleinaltenkamp [Dynamisierung 1987], pp. 31.

<sup>68</sup> Pine [Mass Customization 1993].

<sup>69</sup> Kaluza [Erzeugniswechsel 1987], Kaluza [Erzeugniswechsel 1989].



them in a dynamic rather than static way. It defines a low-cost position as incurring low costs for switching from one product to another or in other words, for leaping from one experience curve to another. Similarly, differentiation is defined as optimally serving changing customer needs over time rather than serving particular needs at a certain point in time. With this dynamic interpretation also a low-cost position and differentiation gain strategic importance in converging industries as it corresponds to the ever increasing pace of change observed

Chapter 3 examined the effectiveness of Porter's generic strategies in providing a company with a position in the industry where it can defend itself against the five competitive forces or even influence them in its favor. In the course of this examination we found out that these strategies, although valid for more than twenty-five years, have experienced a considerable deterioration of their impact on today's competitive environment. From this increased lack of strategic relevance we inferred the need for new approaches to strategic management and suggested the Dynamic Product Differentiation Strategy as the most promising alternative especially in converging industries. In order to make the conceptual differences and strategic implications between Porter's generic strategies and the Dynamic Product Differentiation Strategy clear, we now apply the same analysis to Kaluza's strategy as to the generic strategies. Based on the structural analysis of industries we will show the potential of the Dynamic Product Differentiation Strategy to protect a company against the five forces or providing it with a competitive edge by altering them.

In converging industries companies face an increasing threat of new competitors entering the industry. This is mainly due to blurred industry boundaries and a closer similarity of products. The Dynamic Product Differentiation Strategy provides an effective shield against new competitors for various reasons. A company pursuing this hybrid strategy competes on flexibility in the first place. The main goal is to achieve a position of a change master, anticipating shifts in customer needs and, thus, serving them in a fast way. In case of an industry-wide leap from one experience curve to another the Dynamic Product Differentiator will be capable of realizing a time lead before its competitors. Additionally, this time lead provides an effective barrier to entry for potential competitors, although limited in time. This fast reaction to fluctuations in customer needs also represents something unique in the industry differentiating a company's products. Over time this dynamic differentiation creates switching costs for buyers in the form of opportunity costs. In addition to traditional switching costs as defined by Porter, a company switching from a Dynamic Product Differentiator to another supplier incurs

costs for not being served in this fast, cost-effective and still high-quality manner. While traditional switching costs are of minor significance in converging industries, these alternative switching costs create an effective barrier to entry. It requires potential competitors to offer major improvements in terms of flexibility and time, which may be very difficult to achieve.

Similar to the threat of entry the process of convergence increases the intensity of rivalry among existing competitors. Since traditional barriers to entry were mostly lifted, the number of players in INFOCOM has increased dramatically. In conjunction to the significantly reduced possibilities of differentiation this high intensity of rivalry forces companies to compete mainly on the basis of prices, advertising, and so forth. A Dynamic Product Differentiator, however, is in the position to avoid these unprofitable price battles. Rather, competition will be settled based on the critical success factors flexibility and time in order to achieve dynamic differentiation. Similar to traditional differentiation, it provides protection against intensive rivalry because of brand loyalty and a resulting low price sensitiveness of customers. Even in the unlikely case the company gets involved in the price competition, the Dynamic Product Differentiation Strategy provides it with a solid competitive basis. Besides flexibility, time, and quality the strategy also aims at reducing switching costs in the production/operations area. As these costs represent a significant fraction of the total costs incurred in modern manufacturing companies, their cost position is influenced in a favorable manner.

Generally, pressure from substitute products is supposed to increase in the course of digital convergence. Products from the industries involved in this process are becoming more and more similar in terms of physical appearance, functionality, and quality. Consequently, the price ceiling companies can ask for their products is further lowered. The Dynamic Product Differentiation Strategy provides a solution to this dilemma. High flexibility and fast reaction create a differentiation advantage by providing customers with something new and innovative. As these forms of differentiation tend to be highly honored by customers in today's fluctuating markets, a Dynamic Product Differentiator is usually in the position to lift the price ceiling back to an adequate level without losing customers to substitute products. Additionally, the critical success factor time provides a company with a pioneering position and therefore, with a temporary protection against substitute products. Theoretically, the Dynamic Product Differentiation Strategy provides even absolute insulation against imitations, as each product is assembled to the needs of a particular customer. As these particular needs do not exist anymore,

traditional imitation becomes virtually impossible. Competitors can only try to imitate the capabilities leading to this form of differentiation.

Another effect resulting from digital convergence is an increased bargaining power of buyers. The conditions making them so powerful have already been discussed: undifferentiated products, a growing number of competitors, and consequently, price competition. This increase in buyers' bargaining power can be offset by the Dynamic Product Differentiation Strategy. Only a company pursuing this strategy can dispose of the necessary high amount of flexibility to meet fluctuating customer needs in a fast and still cost-effective manner. Therefore, buyers' alternatives to switch from one supplier to another are limited. In this case, their bargaining power decreases significantly. This effect is even enforced, if their business is heavily dependent on fast reaction of suppliers to shifts in demand.

The impact of convergence on the bargaining power of suppliers is more or less of an indifferent nature. We could not observe a clear pattern of influence for this competitive force. However, we definitely know that a Dynamic Product Differentiator can achieve a significant reduction of suppliers' bargaining power. The basis for this capability is modern manufacturing and information technologies this strategy is largely based upon. These technologies significantly reduce a company's costs for switching among different sources of supply, weakening the bargaining position of its suppliers.

This strategic effectiveness of the Dynamic Product Differentiation Strategy in converging industries is the result of a variety of operational steps that need to be taken in different areas: technology, organization, and human resources. Thus, the Dynamic Product Differentiation Strategy is not just another way of differentiating itself from competitors. Rather, it is a new way of thinking that needs to be reflected by a company's structure and culture. Implemented effectively, this strategy leads to the strong strategic position of a „change master“<sup>70</sup> which provides a company with a substantial competitive edge in today's dynamic marketplace.

### 4.3 Implementation of the Dynamic Product Differentiation Strategy

We already emphasized the importance of the production/operations area as the core functional area for successfully pursuing the Dynamic Product Differentiation

---

<sup>70</sup> Moss Kanter [Change Master 1985].

Strategy. Now we will analyze, what concrete steps need to be taken in order to acquire the necessary excellence in this area. The implementation process needs to address three major issues: technology, organization, and human resources as they represent the basis for reducing costs, increasing differentiation and enhancing flexibility.

Unlike in the area of mass production twenty years ago, today a growing number of customers demands manufacturing companies to produce individual products which serve their specific needs. Manufacturers can only meet this demand by taking advantage of modern production technologies as well as information and communication technologies.<sup>71</sup> Modern production technologies include machine tools based on Numerical Control (NC), Computerized Numerical Control (CNC), and Direct Numerical Control (DNC). NC appliances are controlled by the input of numerical data. This approach already leads to an increase in flexibility on the shop-floor as setup times and lead times are significantly reduced. However, in most cases NC machines have been replaced by CNC-tools, which are controlled by a central micro-computer or mini-computer, providing an even higher potential to shift among different products in a fast and cost-effective manner. State of the art in this field is DNC-machine tools which can be controlled by a single central computer in a large number. These modern production technologies combine the benefits of a job shop and a continuous flow production.

The second type of technologies increasingly used in manufacturing companies is information and communication technologies.<sup>72</sup> These technologies include Computer-Aided Design (CAD), Computer-Aided Planning (CAP), Computer-Aided Manufacturing (CAM), and Computer-Aided Quality Assurance (CAQ). CAD and CAM have the highest impact on the critical success factors flexibility and time. In general, CAD significantly reduces lead time in R&D. Additionally, it allows a company to re-design its products according to the needs of a particular customer in a fast way. This computerized adoption process is very cost-effective and provides high-quality and innovate products. Similarly, CAM increases the flexibility in the production/operations area. Connected to CAD, data from R&D can immediately flow into production control. Physical setup activities on the shop floor are reduced to a minimum, resulting in low setup times and lead times. Therefore, CAD and

---

<sup>71</sup> Kaluza [Erzeugniswechsel 1989], pp. 118.

<sup>72</sup> Kaluza [Produktdifferenzierungsstrategie 1996], pp. 39.

CAM-systems support the simultaneous achievement of the critical success factors costs, quality, flexibility, and time. This potential is significantly enhanced by integrating these technologies into Computer Integrated Manufacturing (CIM).<sup>73</sup>

Generally, the Dynamic Product Differentiation Strategy requires the implementation of organizational concepts in the production/operations area which allow to exploit the simultaneous potential of modern technologies.<sup>74</sup> This crucial requirement can be met by implementing different forms of team work and networking on the shop floor. A respective organization allows to reduce costs by extensively using a process of continuous improvement that comes along with committed teams. Additionally, this approach increases flexibility and quality in the production/operations area providing the company with a high degree of dynamic differentiation. Finally, decentralized teams can react faster to changes in demand and needs of internal and external customers. Possible variations of team work include: flexible machine cells, flexible production segments, and the concept of lean management. Flexible machine cells are characterized by a heterogeneous machinery equipment. The resulting wide range of different operations that may be performed in a single cell allows the team to produce entire components rather than single parts of a product. Consequently, the team acts relatively autonomous within the boundaries of the cell. Additionally, team members perform managerial activities like capacity management and scheduling.

Combining different machine cells with respect to a certain product leads to flexible production segments. These segments comprise several stages of the production process of the respective product. Additionally, each of these segments pursues its specific marketing strategy. Like flexible machine cells, also in flexible production segments team members are empowered to take over managerial responsibility, although to a higher extent. Consequently, in many cases flexible production centers are organized as cost or profit centers with performance responsibility. Both concepts provide similar benefits: an increase in flexibility and a decrease in costs. Additionally, also the critical success factor time is influenced in

---

<sup>73</sup> Kaluza [Erzeugniswechsel 1989], pp. 244.

<sup>74</sup> Kaluza [Produktdifferenzierungsstrategie 1996], pp. 42.

a favorable manner. Thus, they significantly support the Dynamic Product Differentiation Strategy<sup>75</sup>.

A concept that goes beyond the two already discussed is 'lean management'. This concept strives for the elimination of all waste in the system. Unlike flexible machine cells and flexible production segments it applies teamwork and networking to all areas of a company. As a result, it leads to a significant reduction of hierarchies and the forming of cross-functional networks, significantly enhancing a company's flexibility and time advantages.<sup>76</sup>

Today's competitive environment requires companies to extensively use the creative and flexible potential of their human resources.<sup>77</sup> Therefore, we assess human resources as a key issue for a successful implementation of the Dynamic Product Differentiation Strategy. Teamwork as a concept which considers this increased importance of the human factor was already discussed in the previous paragraph. In general teamwork approaches lead to a shift of responsibility from managers to subordinates. We suggest cooperative leadership styles which encourage employees to take over managerial responsibilities. Cooperative leadership results in an increased self-management of employees. Thus, the company-wide demand for managerial and administrative activities decreases enhancing a company's flexibility.

In general, technology, organization, and human resources are highly interdependent concerning their implications on critical success factors. As these relations are of a complementary nature, in most cases synergistic effects can be obtained by integrating these three major issues during the implementation process of the Dynamic Product Differentiation Strategy.

## 5 Conclusion

We started our investigation of the implications of digital convergence on strategic management with a brief discussion of the concept of digital convergence. The process of convergence was initiated a few years ago by the rapid progress in digital technologies and has gained increased practical importance since then.

---

<sup>75</sup> Corsten/Will [Simultaneität 1995], pp. 235.

<sup>76</sup> Charan [Networks 1991], pp. 104.

<sup>77</sup> Kaluza [Produktdifferenzierungsstrategie 1996], pp. 48.

However, a clear definition of the term „convergence“ does not exist yet. Common definitions range from easily understood to scientific approaches. Similarly, there is no consent on the major driving forces behind the process of convergence, although digital technology is widely considered as being the most important of these forces.

The following chapter presented a thorough analysis of the strategic implications of digital convergence. In order to show the multiple effects of convergence on strategic management we chose a three-steps approach for this analysis. In a first step we investigated the implications on industry structure based on Porter's concept of structural analysis of industries. It showed that three of the five competitive forces determining the profitability of an industry are altered in an unfavorable way while two others are influenced indifferently. This shift in the strengths of the five competitive forces leads to an overall increase of competition in the INFOCOM industry and a resulting lower profitability. The second step of our analysis aimed at investigating the implications on critical success factors. For this purpose we chose four major critical success factors: costs, differentiation, flexibility, and time. In general, we noticed a significant decrease in the strategic importance of the traditional factors costs and differentiation. The innovative success factors flexibility and time, however, have gained importance for strategic management in converging industries. These implications on major critical success factors have significant consequences on Porter's widely used generic strategies. Therefore, in a third step we explicitly analyzed the implications of digital convergence on these strategies. Porter's first generic strategy of overall cost leadership is largely undermined by digital convergence. This is mainly due to the significantly reduced relevance of costs as a critical success factor. As this strategy is solely based upon this factor, its strategic validity becomes highly questionable. Also Porter's alternative strategy of differentiation shows conceptual drawbacks if applied to the dynamic and complex environment of converging industries. These drawbacks make it virtually impossible for a company to position itself uniquely in INFOCOM by pursuing the generic strategy of differentiation. Porter's third path towards long-term success is focus. As focus is basically a derivative of the two others, their limitations in converging industries also apply to this strategy.

We introduced hybrid strategies as a solution to this dilemma of strategic management in converging industries. Unlike Porter, these strategies emphasize the gaining of a competitive edge by achieving both a low-cost position and differentiation. They stress the notion of a high profitability accompanied with this position rather than being stuck in the middle. Additionally, hybrid strategies are dynamic

concepts as they refer to a period of time rather than a certain point in time. A hybrid strategy that seems to be particularly tailored to the needs of strategic management in converging industries is Kaluza's Dynamic Product Differentiation Strategy. It aims at gaining a competitive edge by focusing on costs, differentiation, flexibility, and time simultaneously. Thus, it enables companies to respond to the high complexity and dynamics of INFOCOM by reacting to changes in customer needs in a fast and cost effective manner and still providing a high level of quality.

In the following paragraphs we applied the structural analysis of industries to the Dynamic Product Differentiation Strategy in order to assess its effectiveness in converging industries in direct comparison to Porter's generic strategies. Generally, the Dynamic Product Differentiation Strategy provides protection against each of the five competitive forces. It represents an effective barrier to entry as it creates alternative switching costs for buyers. A company pursuing this strategy can avoid price battles as it competes mainly on dynamic differentiation based on flexibility and time. As this form of differentiation is honored by customers it allows the company to demand reasonable prices without losing them to substitute products. Finally, it significantly reduces the bargaining power of suppliers and buyers. Suppliers' power decreases as switching costs are very low due to the modern manufacturing and information technologies employed by the Dynamic Product Differentiator. Buyers' bargaining power, however, is reduced by the already mentioned dynamic differentiation resulting from pursuing this strategy.

Successful implementation of the Dynamic Product Differentiation Strategy requires a series of operational steps in the areas of technology, organization, and human resources. Technologies supporting this strategy are modern manufacturing as well as information and communication technologies. These technologies provide high flexibility on the shop floor by allowing fast and cost-effective shifts among different products. Additionally, they significantly reduce lead time in adjacent areas like R&D and so forth. However, modern technologies need to be accompanied by adequate organizational concepts. Recent approaches in this area consist of various forms of team work and networking on the shop floor. These approaches significantly increase flexibility and quality in production/operations. If these concepts are applied to the entire organization in order to eliminate all waste in the system we talk about lean management. Finally, cooperative leadership styles need to be implemented in the area of human resources in order to encourage employees to take over the necessary managerial responsibilities.



In this paper we showed the effects of digital convergence on the information and communication business. These effects mainly consist of a substantial alteration of the competitive environment in the form of blurred industry boundaries, increased rivalry, and a reduced relevance of traditional success factors. With the Dynamic Product Differentiation Strategy we presented a strategic concept which enables companies to compete successfully in this altered economic environment.

## Bibliography

### **Albach/Wildemann [Investitionsplanung 1986]**

Albach, H., Wildemann, H. (Ed.): Strategische Investitionsplanung für neue Technologien, ZfB-Ergänzungsheft No. 1, Wiesbaden: Gabler 1986.

### **Baldwin et al. [Convergence 1996]**

Baldwin, Th. F./McVoy, D. S./Steinfeld, C.: 'Convergence. Integrating Media, Information & Communication', Thousand Oaks et al.: Sage Publications 1996.

### **Caves [Industry 1964]**

Caves, R. E.: 'American Industry. Structure, Conduct, Performance', Foundations of Modern Economics Series, Englewood Cliffs N. J.: Prentice-Hall 1964.

### **Chakravarthy [INFOCOM 1993]**

Chakravarthy, B.: 'The Global Information and Communications (INFOCOM) Industry: Emerging Scope', INSEAD Note 08/93-349, Fontainebleau 1993.

### **Chakravarthy [Commitments 1994]**

Chakravarthy, B.: 'Flexible Commitments: Coping with Chaos', INSEAD Working Paper 94/17/SM/ENT, Fontainebleau 1994.

### **Charan [Networks 1991]**

Charan, R.: 'How Networks Reshape Organizations', *Harvard Business Review*, Vol. 69, No. 5, pp. 104 - 115.

### **Collis et al. [Structure 1996]**

Collis, D. J./Bane, P. W./Bradley, S. P.: 'Winner and Loser-- Industry Structure in the Converging World of Telecommunications, Computing and Entertainment', Harvard Business School Working Paper No. 96-003, Boston 1996.

### **Corsten [Produktion 1995]**

Corsten, H. (Ed.): 'Produktion als Wettbewerbsfaktor. Beiträge zur Wettbewerbs- und Produktionsstrategie. Ein Reader', Wiesbaden: Gabler 1995.

### **Corsten/Will [Simultaneität 1995]**

Corsten, H./Will, Th.: 'Simultaneität von Kostenführerschaft und Differenzierung durch neuere Produktionskonzepte', in: Corsten [Produktion 1995], pp. 235 - 248.

### **Duysters/Hagedoorn [Convergence 1995]**

Duysters, G./Hagedoorn, J.: 'Convergence and Divergence in the International Information Technology Industry', in: Hagedoorn [Change 1995], pp. 205 - 234.

### **Duysters/Hagedoorn [Convergence 1997]**

Duysters, G./Hagedoorn, J.: 'Technological convergence in the IT industry: the role of strategic technology alliances and technological competencies', Research Memoranda 97015, Draft, MERIT, Faculty of Economics and Business Administration, Maastricht University, Maastricht 1997.

**European Commission [Convergence 1997]**

European Commission: 'Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for Regulation. Towards an Information Society Approach', COM(97)623, Brussels 3 December 1997, (<http://www.ispo.cec.be/convergencegp/>).

**Fachverband Informationstechnik [Computerbranche 1997]**

Fachverband Informationstechnik: 'Computerbranche gut gelaunt zur IFA, PC-Anbieter rechnen mit einem Nachfrage-Plus von 12%', (<http://www.fvit-eurobit.de/PAGES/FVIT/PRESSE/Presseinfos/PR027.HTM>).

**Fehr [Kreativität 1998]**

Fehr, B.: 'Im Schwungrad der Kreativität', in: *Frankfurter Allgemeine Zeitung*, 06/28/1997, p. 13.

**Fleck [Wettbewerbsstrategie 1995]**

Fleck, A.: 'Hybride Wettbewerbsstrategie. Zur Synthese von Kosten- und Differenzierungsvorteilen', Wiesbaden: Gabler 1995.

**Gilbert/Strebel [Strategies 1987]**

Gilbert, X./Strebel, P.: 'Strategies to outpace the competition', in: *Journal of Business Strategy*, Vol. 9, pp. 28 - 36.

**Gilbert/Strebel [Advantage 1991]**

Gilbert, X./Strebel, P.: 'Developing competitive advantage', in: Mintzberg/Quinn [Strategy 1991], pp. 82 - 93.

**Greenstein/Khanna [Convergence 1997]**

Greenstein, S./Khanna, T.: 'What does Industry Convergence mean?', in: Yoffie [Convergence 1997], pp. 201 - 226.

**Hagedoorn [Change 1995]**

Hagedoorn, J. (Ed.): 'Technical Change and the World Economy. Convergence and Divergence in Technology Strategies', Hants — Vermont: Edward Elgar 1995.

**Hall [Strategies 1980]**

Hall, W. K.: 'Survival Strategies in a hostile environment', in: *Harvard Business Review*, Vol. 58, pp. 75 - 80.

**Hamel [Collaboration 1990]**

Hamel, G.: 'Competitive Collaboration: Learning, Power and Dependence in International Strategic Alliances', unpublished Dissertation at University of Michigan, East Lansing 1990.

**Henderson [Erfahrungskurve 1984]**

Henderson, B. D.: 'Die Erfahrungskurve in der Unternehmensstrategie', 2. überarbeitete Aufl., Frankfurt - New York: Campus 1984.

**Intel [Moore's Law 1998]**

Intel Corp.: 'What's Moore's Law', (<http://www.intel.com/intel/museum/25anniv/hof/moore.htm>), o.O. 1998.

**Kaluza [Erzeugniswechsel 1987]**

Kaluza, B.: 'Erzeugniswechsel als betriebswirtschaftliches Problem', unpublished Habilitation-Thesis, University of Mannheim 1987.

**Kaluza [Erzeugniswechsel 1989]**

Kaluza, B.: 'Erzeugniswechsel als unternehmenspolitische Aufgabe, Integrative Lösungen aus betriebswirtschaftlicher und ingenieurwissenschaftlicher Sicht', Berlin et al.: Erich Schmidt Verlag 1989.

**Kaluza [Produktdifferenzierungsstrategie 1996]**

Kaluza, B.: 'Dynamische Produktdifferenzierungsstrategie und moderne Produktionskonzepte', Discussion Paper of the Department of Economics No. 211, University of Duisburg 1996.

**Kaluza et al. [Telekommunikationstechnologien 1996]**

Kaluza, B./Blecker, Th./Sonnenschein, M. (1996), 'Telekommunikationstechnologien — eine Waffe im Wettbewerb?', Discussion Paper of the Department of Economics No. 230, University of Duisburg 1996.

**Kaluza et al. [Convergence 1998]**

Kaluza, B./Blecker, Th./Bischof, Ch.: 'Implications of Digital Convergence on Strategic Management', forthcoming in: *International Journal of Development Planning Literature*, Vol. 13.

**Kleinaltenkamp [Dynamisierung 1987]**

Kleinaltenkamp, M.: 'Die Dynamisierung strategischer Marketing-Konzepte. Eine kritische Würdigung des „Outpacing Strategies“-Ansatzes von Gilbert und Strebel', in: *Zeitschrift für betriebswirtschaftliche Forschung*, Vol. 39, No. 1, pp. 31 - 52.

**Mason [Monopoly 1939]**

Mason, E. S.: 'Monopoly in Law and Economics', in: *Yale Law Journal*, Vol. 47, pp. 34 - 49.

**Messerschmitt [Convergence 1996]**

Messerschmitt, D. G.: 'The convergence of telecommunications and computing: What are the implications today', *IEEE Proceedings*, August 1996, (<http://ptolemy.eecs.berkeley.edu/~messer/PAPERS/96/Proc1/Proc1.pdf>), Berkeley 1996.

**Messerschmitt [Future 1996]**

Messerschmitt, D. G.: 'The future of computer-telecommunications integration', paper in *IEEE Communications Magazine*, special issue on „Computer-Telephony Integration“, April 1996, (<http://ptolemy.eecs.berkeley.edu/~messer/PAPERS/96/ComMag1/ComMag1.pdf>), Berkeley 1996.

**Miller/Friesen [Strategies 1986]**

Miller, D./Friesen, P. H.: 'Porter's (1980) Generic Strategies and Performance: An Empirical Examination with American Data. Part I: Testing Porter', in: *Organization Studies*, Vol. 7, No. 1, pp. 37 - 55.

**Mintzberg/Quinn [Strategy 1991]**

Mintzberg, H./Quinn, J. B. (Ed.): 'The strategy process, Concepts, Contexts, Cases', 2<sup>nd</sup> Ed., Englewood Cliffs, N.J.: Prentice-Hall 1991.

**Moss Kanter [Change Masters 1985]**

Moss Kanter, R.: 'The Change Masters. Innovation for Productivity in the American Corporation', London et al.: Simon & Schuster 1985.

**Neukirchen/Schneider [Interview 1998]**

Neukirchen, H./Schneider, M.: 'Was wir vorhaben, wird Begeisterung auslösen', Interview with Heinrich von Pierer, in: *Welt am Sonntag*, 04/26/1998, p. 43.

**OECD [Convergence 1996]**

Organization for Economic Co-Operation and Development: 'Convergence Between Communications Technologies: Case Studies from North America and Western Europe', Information Computer Communications Policy No. 26, Paris: OECD 1996.

**Pine [Mass Customization 1993]**

Pine, B. J.: 'Mass Customization', Boston: Harvard Business School Press 1993.

**Porter [Theory 1991]**

Porter, M. E.: 'Towards a dynamic Theory of Strategy', in: *Strategic Management Journal*, Vol. 12, Spec. Iss., pp. 95 - 117.

**Porter [Strategy 1996]**

Porter, M. E.: 'What is Strategy?', in: *Harvard Business Review*, Vol. 74, No. 6, pp. 61 - 78.

**Porter [Advantage 1998]**

Porter, M. E.: 'Competitive Advantage. Creating and Sustaining Superior Performance', 2<sup>nd</sup> Ed., New York et al: The Free Press 1998.

**Porter [Strategy 1998]**

Porter, M. E.: 'Competitive Strategy. Techniques for Analyzing Industries and Competitors', 2<sup>nd</sup> Ed., New York et al: The Free Press 1998.

**Schaller [Implications 1996]**

Schaller, B.: 'The Origin, Nature, and Implications of Moore's Law', (<http://mason.gmu.edu/~rschalle/moorelaw.html>), o.O. 1996.

**Siemens [Press Release 1998]**

Siemens AG: 'Siemens bereitet umfassende Neuaufstellung der Arbeitsgebiete Information und Kommunikation vor. Vorreiter bei der Zusammenführung von Daten- und Kommunikationstechnik', Press Release 04/23/1998, München 1998.

**Tapscott [Revolution 1996]**

Tapscott, D.: 'Die digitale Revolution. Verheißungen einer vernetzten Welt — die Folgen für Wirtschaft, Management und Gesellschaft', Wiesbaden: Gabler 1996.

**Wegberg [Alliances 1995]**

Wegberg, M. van: 'Mergers and Alliances in the Multimedia Market', Discussion Paper, Rijksuniversiteit Limburg, Maastricht 1995.

**White [Strategies 1986]**

White, R. E.: 'Generic Business Strategies, Organizational Context and Performance: An Empirical Investigation', in: *Strategic Management Journal*, Vol. 7, pp. 217 - 231.

**Wildemann [Investitionsplanung 1986]**

Wildemann, H.: 'Strategische Investitionsplanung für neue Technologien in der Produktion', in: Albach/Wildemann [Investitionsplanung 1986], pp. 1 - 48.

**Wildemann [Fabrik 1989]**

Wildemann, H.: 'Die neue Fabrik', in: *Blick durch die Wirtschaft*, 05/24/1989, p. 7.

**Yip [Barriers 1982]**

Yip, G. S.: 'Barriers to Entry, A Corporate-Strategy Perspective', Lexington: Lexington Books, 1982.

**Yoffie [Competing 1997]**

Yoffie, D. B.: 'Introduction. CHES and Competing in the Age of Digital Convergence', in: Yoffie [Convergence 1997], pp. 1 - 35.

**Yoffie [Convergence 1997]**

Yoffie, D. B. (Ed.): 'Competing in the Age of Digital Convergence', Boston: Harvard Business School Press 1997.

## **Bisher erschienene Diskussionspapiere der Universität Klagenfurt**

- 9701 Hans-Joachim Bodenhöfer / Monika Riedel  
Bildung und Wirtschaftswachstum — Alte und neue Ansätze  
Februar 1997
- 9702 Hans-Joachim Bodenhöfer  
Kärnten 1945 - 1995. Wirtschaftspolitische Probleme und Leitlinien  
Juni 1997
- 9801 Michael Kosz  
On-site vs. Distant questioning: some empirical evidence from valuing  
recreation functions of city-near forests  
Mai 1998
- 9802 Michael Kosz  
The social context of valuing regional biodiversity  
Juli 1998
- 9803 Bernd Kaluza / Thorsten Blecker / Christian Bischof  
Strategic Management in Converging Industries  
November 1998  
ISBN 3-85496-000-X