D O C T O R A A T S P R O E F S C H R I F T

Faculteit Toegepaste Economische Wetenschappen

IS-Enabled Change Management and Competitive Advantage in the Financial Sector

Proefschrift voorgelegd tot het behalen van de graad van Doctor in de Toegepaste Economische Wetenschappen

Alea Maya FAIRCHILD

Promotor : Prof. dr. R. Mercken

2001



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2001

16 JULI 2001





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Acknowledgements

This has been somewhat of labor of love for more than four years. Without the support of both academic and industry colleagues, friends and family, I probably would not be at this point today. The fact that commercial colleagues have understood and supported my research efforts shows that industry values and respects the work of academics as part of innovation and progress in commerce.

I would like to acknowledge the continued support of Prof. dr. Roger Mercken and the other members of the Jury for their advice and guidance in structuring and completing this research: Prof. dr. Wim Van Grembergen, Prof. dr. Egon Berghout, Prof. dr. Eric Lefebvre, Prof. dr. Jan Broeckmans, and Prof. dr. Piet Ribbers. I would also like to thank Prof. dr. Jan Broeckmans for seeing me through my research methodology challenges, and introducing me to research philosophy.

I would like to state my appreciation to the Belgische Vereniging Van Banken (BVB), and to the two banks involved in the case studies for their time and efforts in participating in this research.

I would also like to express my appreciation to my "study buddy", Dr. Ann MacNeill of the University of Edinburgh Business School, whom I met at the ECIS Doctoral Consortium and who has continued, through both of our doctoral theses, to be a source of advice and a source of comfort for comparison of research dilemmas.

Finally, I wish to give my heartfelt appreciation to my husband Bruno, who has supported and promoted my journey back into academia. In this respect, I am also thankful for the fact that I married someone who works more hours than I do.

Alea Fairchild June 2001



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Chapter 1: Introduction and Research Methodology

1.1 Background of the Research

A persistent finding of research into the performance of financial institutions is that performance and efficiency vary widely across institutions (Hitt, Frei, and Harker, 1998). This variability, according to Hitt, Frei, and Harker, is nowhere more visible than in the outcomes of IS investment decisions in these institutions. In addition to being a large component of the cost structure, IS has a strong influence on financial firm operations and strategy. Few financial products and services exist that do not utilize computers at some point in the delivery process and a firm's information systems place strong constraints on the type of products offered, the degree of customization possible and the speed at which firms can respond to the competitive opportunities or threats (Hitt, Frei, and Harker, 1998).

The competition in banking markets is fierce and changing in nature. The increasing speed of telecommunications and transmission of information on money markets, foreign competition and new technology advances with the Internet are daily reminders to bankers that they are competing in a global economy. Principles of success in both European and Belgian banking are changing constantly, in a field once considered stable and conservative. At the heart of success for banks now are the new technologies. Banks must become as good at managing their information assets as any other type of asset. (Hickman, 1993). The information assets are considerable and in fact, many people today see a real transformation in the banking industry evolving as they become increasingly information based. Banks become transformers of information on capital owners, debtors and creditors, investments and all the financial transactions. Information is the representation of physical goods and is central to the banking operation. As that occurs, even the physical location of the bank may become less and less relevant. In its place are networks linked by information technology; networks with branches, customers, other banks, and other financial product institutions. To remain competitive, information technology is a key enabler for strategies: to create new financial products, to become more customer focused, to

offer value-added services, to shorten transaction cycles, to increase the speed of transactions, to improve balance sheet management through timely information. All of these, and many more competitive factors can be realized by using technology tools. (Hickman, 1993)

1.2 Research problem and hypothesis / questions

1.2.1 Research Problem

This research evaluates technology as an input to the banking organization in order to achieve competitive advantage in the industry.

The research examines how the components of the organizational structure, work processes and management decisions impact the defined output of the technological input.

The research is segmented into two parts: a quantitative evaluation of IS's impact in terms of productivity and profitability output, and more qualitative diagnosis of the organization based on the results of the output figures.

The researcher will examine the Belgian overall banking environment and the use of technology by several leading financial institutions to investigate several interrelated questions. Then two financial institutions are analyzed for further case research on the organizational structure and utilization of technology. The selection of the two financial institutions is from the results of the structured framework comparing their productivity and profitability output of their IS investments to the Belgian banking industry average, as calculated by the research methodology.

1.2.2 Research Questions

The research questions consist of:

- 1. Are there measures that can evaluate how effectively banks utilize IS investments?
- 2. What impact does the organizational structure have on the IS output performance?
- 3. What are the areas of potential change within the organization that can positively impact the use of IS investments?

To answer these questions, the research will evaluate the IS spending during this period in the Belgian retail banking sector at an industry level observation, as to see what productivity and profitability measures

Then the research will assess several leading retail banks to see how they measure against the industry 'average', and which of the banks are at the opposite ends of the scale, as to compare their organizational structure and implementation of technology and IS spending. A structured open systems framework was developed for cataloguing IS investment in these two banks. This diagnostic framework for the organizations was populated by using a combination of documents and semi-structured interviews to make a diagnosis of what makes a firm have higher level / lower level of achievement as comparison to the industry averages.

The researcher will then compare the results of this exercise, together with a synthesis of the literature on IS investment, to understand how practices vary across firms and what organizational aspects have a positive impact on technology usage, as described in previous literature.

1.3 Research Relevance

Beyond the econometric analysis, the research will present an exploratory investigation into what organizational characteristics of a bank lead to an effective use of IS capital and labor. As part of the ongoing bank mergers in Belgium, management is focused on cost reduction and efficiency for competitive positioning, and is looking to find a way to qualify the usage and expenditure of IS and its benefits to the environment. Initial contacts in the banking industry, both banks and technology providers, have been quite interested in the potential for the results of this research.

There are several perspectives as to the IS role in the organization, besides the role of providing transaction efficiency. IS also has the potential to change the way organizations coordinate (Kling et al, 1996), as an enabler, and given the changes in coordination and communication due to mergers, this is important for these banks at this time. Because the effective coordination of separate activities within organizations and between organizations plays such a large role in organizational performance, it is important to know how organizations use IS as a coordination tool to enable their activities. What coordination problems does IS solve in practice, and what new coordination problems does it bring to the surface? What is easy about turning technological potential into organizational performance, and what is difficult? (Kling et al, 1996).

One thought is all of this analysis may point to the need for investment in not only the technical skills of this IS work force, but their industry-specific and organizational knowledge as well. As the "process engineers" of the organization, the IS organization is crucial in the design, control, and execution of service delivery in banks. Thus, a key driver of efficiency and effectiveness in the industry could be the IS organization's relationship with the organization.

This research has the possibility to be extended in several directions. Analysis can be conducted as to what can be said about human resource practices and workorganization, and how they affect the implementation and use of IS. Other questions that could be asked from this research are:

- Does the IS capital budgeting process influence IS contributions toward productivity and efficiency?
- Do firms that employ "technology committees" to make IS-investment decisions see better returns from IS than those that rely on "pioneers" who promote IS use in the firm?

The diagnostic framework to be established from the case studies should be useful to point to specific areas for future research.

1.4 Methodologies used

The research was designed in two parts: a quantitative evaluation of IS's impact in terms of productivity and profitability output for both the overall industry and the specific banks, and more qualitative diagnosis of the two bank organizations based on the results of the output figures. The rationale for using both of the two methodologies is that previous studies (Alpar and Kim, 1991; Prasad and Harker, 1997) have considered the role of technology in the banking industry but these studies, however, did not consider how this IS contribution or level of investment varies across firms. Brynjolfsson and Hitt (1995) found that "firm effects" can account for as much as half of the contribution of IS found in earlier studies. Recent results suggest that at least part of these differences can be explained by differences in organizational and strategic factors.

1.4.1 Quantitative Methods

In anticipation of the expected lowering of barriers to competition among financial institutions within the European Monetary Union (EMU), many EMU countries have recently experienced consolidation of their domestic banking industry. One reason for this consolidation is the belief that larger banks will be better able to adjust to the needs of the customers when they will be allowed to set up branches in any other country, subject only to the regulations of their home country. As domestic markets become more competitive, current differences in costs and productive efficiency among the banking industries of EMU countries will largely determine each country banking structure and future competitive viability. Thus, it is important to know how different or similar are current banking costs and productive Chapter 1

efficiency between countries in order to predict the effects of the expected increase in cross-border competition.

Given that there are different banking activities within a bank organization (investment banking, foreign exchange, retail banking, mortgage lending, etc.), technology investment can differ by activity need. Retail banking, as defined in the Appendix, covers a wide variety of both consumer and small business activities. For retail banking, the technology of the banks can be defined as the set of the specific methods that the banks use to combine financial and physical inputs in order to produce a certain amount of banking services, such as liquidity and payment services, portfolio services, loan services. Those methods include diversification, pooling of risk, financial information collection and evaluation, and risk management.

What the banks themselves measure is both IS and non-IS expenditure, both in terms of capital outlay by type of expenditure (hardware, software and networks) and in terms of permanent and temporary personnel. Given the cost reduction concerns of the banks and the focus on the bottom line, it appeared to be a natural fit to try to determine the relationship between the IS inputs and the financial output figures as a measure of productivity and profitability, both which impact the competitive positioning of a bank. Given a wide range of previous research literature on this topic, there was also a rational basis for the quantitative measurement. The quantitative portion of the research will examine technology input components and the corresponding output, using a Cobb-Douglas production function.

There is an additional benefit from the quantitative research in that it provided discussion points, based on historical data, about IS and non-IS spending patterns over the timeframe and how these varied per year, in terms of the decisions made. In using production theory to compare the banks at a firm level, to answer the first research question, part of the research objectives are to find a basis for a more qualitative evaluation for the second and third research questions.

1.4.2 Qualitative Methods

For the qualitative phase following the quantitative evaluation, the researcher will examine two banks to diagnose what, if any, differences exist on how the IS investment is utilized within the organization. There are many debates on the use of IS in organizations that focus on firm level choices, sectorial analysis and the forces of the market (i.e. Porter, 1980). While there is substantial debate as to the role of various organizational and strategic factors, there is one unambiguous result: that most of the efficiencies of banks is not explained by the factors that have been considered in prior work.

The framework for comparison of the two banks will be based on the open systems theory in order to analyze the interaction with the environment for each banking organization. Open systems can be defined as a system of interdependent activities; that is systems that are neither a formal structure nor an organic entity. Scott (1992) describes "the parts of systems join and leave or engage in ongoing exchanges with the organization depending on the bargains they can strike. Some of these activities are tightly connected; others are loosely coupled." That is, all of the system's parts must be continuously motivated to produce and reproduce in a system. Scott also emphasizes "systems are interdependent activities linking shifting coalitions of participants; the systems are embedded independent on continuing exchanges with and constituted by the environments in which they operate." The salient characteristics of an open system is a self-maintenance based on a process of resources from the environment and interaction with the environment.

The open systems approach has been chosen because it has been commended for its potential usefulness in "synthesizing and analyzing complexity" (Simon, 1969) in "live" organizations. Comprehension of a system cannot be achieved without a constant study of the forces that impinge upon it (Katz and Kahn, 1978). Leavitt, Pinfield and Webb (1974) also recommended an open- systems approach for studying contemporary organizations which now exist in a fast-changing and turbulent environment. Ramstrom (1974) propounds increased emphasis on systems thinking to

Chapter 1

comprehend the increased interdependencies between the system and its environment, and between the various parts of the system.

To define the impact of the environment on the organization requires one to characterize some working conceptions of environments themselves; it is necessary to describe their characteristics and assess their relevant features. The environment consists of many facets; systematically approaching the definition of the environment means addressing all of those facets in a rational way. For a given system, the environment is the set of all objects a change in whose attributes affect the system and also those objects whose attributes are changed by the behavior of the system (Hall and Fagen, 1956). The research approach to characterize the working conceptions for this research is an organization-level case study, based on an interpretive stance, to see how the different players in the organization observed the environmental interactions.

The organization, in open systems theory, consists of a set of independent or interdependent variables. Variations in the conceptions of environments under this tenant can come from three sources: differences in which the organizational components or dimensions are singled out for evaluation; differences in levels of analysis; and differences in the degree of independence attributed to the environment (Scott 1992).

In the analysis of an environment, one of the more neglected aspects of organizational-environmental relations is the analysis of the impact of cultural factors. In the Belgian banking environment, this analysis can include both linguistic and demographic elements.

The work of Geert Hofstede (1983) established four key characteristics or dimensions that vary from culture to culture. Two of these dimensions can affect how we do business across borders, namely Power Distance (the extent to which a person or a culture leans towards a structured environment) and Uncertainty Avoidance (the degree to which a culture finds uncertainty threatening). Having collected data on over 50 countries, Hofstede has made analyzes of both Belgium and its neighbors. Hofstede groups Belgium in with Latin European countries studied (Italy, Spain, France, Portugal) and these countries belong to the group where respondents scored high on both Power Distance and Uncertainty Avoidance. In other words, these countries have large inequalities and strong need for structure. Belgium's neighbor to the north, The Netherlands, is considered part of the North- and West- European countries which also include Denmark, Sweden, Norway, Ireland, and Britain. These countries are considered to have small Power Distance combined with weak Uncertainty Avoidance. These countries are seen as similar by Hofstede (1983) in the sense that in their people's mental programs there is little social inequality and little need for structure. It is unclear if Hofstede takes into consideration Belgium's linguistic divide in its classification into the Latin European countries, an interesting point given the Belgian retail banking environment has had recent mergers with both French and Dutch banks, and the work of Van Dorn (1979) also addresses that issue.

Lammers and Hickson (1979) suggest that culture patterns can affect organizations in three ways:

- Through the existence of generalized social values, norms and roles, often embedded in legal requirements and governmental regulation, which influence the ways in which organizations are evaluated and the responses of their significant publics;
- Through the existence of social models and premises concerning what organizations "can and should be" that influence the conceptions of those who design and redesign organizational systems; and
- 3. Through the benefits and actions of both elite and rank-and-file participants who "perform their roles and relate to one another in ways which stem from values, norms and roles 'imported' from the outside."

Lammers and Hickson (1979) suggest that these types of influence from the surrounding culture penetrate organizations so that salient variables and relationships are affected. Lammers and Hickson (1979) identify four types of effects:

- 1. Difference of degree in a particular variable, such as formalization
- 2. Trait differences, such as discrimination on certain ethnic groups
- 3. Relational differences, such as level of supervision

 Type differences, such as the suggestion that different types of organizational forms exist in different cultures.

Given the last effect actually exists, it would be the most far-reaching of the four types. Lammers and Hickson (1979) summarize several studies aimed at detecting cross-cultural differences in organizational types, concluding with three distinctive cultural forms:

- Latin (French, Spanish, Italian), characterized by relatively high centralization, rigid stratification and sharp inequalities amongst levels
- Anglo-Saxon (British, American, Scandinavian), characterized by more decentralization, less rigid stratification, and more flexible approaches to the application of rules
- Traditional (third world countries, for example), characterized by paternalistic leadership patterns, implicit rather than explicit rules, and lack of clear boundaries separating organizational from non-organizational roles.

Patterns of both Latin and Anglo-Saxon organizational types exist in the Belgian banking sector, and Van Dorn (1979) argues that the types of organizations that arise, the distinctive mix of organizational forms, can be related to the value patterns which characterize a particular society. This is part of the information that will be discussed in the case studies.

As part of the qualitative research, some aspects of IS investment in the current mergers that both banks are involved in will be discussed, mainly in conjunction with the third research question. Although two banks will be discussed as 'case studies', the data from the additional merging banks will also be looked at, to explain current situations for the third research question.

As part of qualitative research, interviews have inevitably led to a discussion of current or planned further restructuring of the banks merged or acquired during the research period, and the consequently planned further enhancements in the IS/organization relationship.

Since Belgian banks, and increasingly their foreign parents or shareholders, must better define the IS role as part of their preparation for, or anticipation of, almost inevitable further consolidation in the Belgian banking sector, these semi-structured interviews can, and apparently do, also hold significance for the third research question. Indeed, these discussions may shed light on the current impressions of Belgian banks on possible process and operational improvements needed to survive the next consolidation round successfully, and potentially based on the best practices of the combined banks.

1.5 Outline of Thesis Content

The initial chapter of this thesis discusses the background of the research problem, focusing on the role of IS in financial services, particularly in the Belgian banking environment and a discussion on process change and the use of IS in the organization. This chapter also provides an overview of the research methodologies used, and the research questions. This chapter suggests what the scope and assumptions of the research contain, and defines particular terms used within the document to assist the reader in orientation.

The second chapter begins the literature review, adding depth to the understanding of the research focus with background on three key areas: the sectorial information on the Belgian banking sector during this timeframe; the role of IS in the financial services community; and the relationship between IS and change process methodologies involved in achieving competitive advantage in banking.

The third chapter of the thesis discusses the research methodology and design of the research project. After the introduction, the framework of the research methods is considered, in reference to both the quantitative and qualitative aspects of the research design. This section of the thesis addresses the subjects of validity and reliability in the research design, and methods to overcome or redress any areas of concern. The third chapter introduces the proposed model for organizational diagnosis, given the information gathered and analyzed from the case studies and industry data. This

chapter defines the components addressed in the model, and discusses the relationship and interaction between these components. The implementation principles and development are also examined, as a function of the research design and methods. The probable level of coordination with other research traditions and paradigms is brought out, and further anticipated challenges from the model implementation are discussed.

The fourth chapter of the research thesis provides an industry background on Belgian banking and the internal and external environmental factors that were impacting the market during this period. This chapter provides a backdrop of industry figures and a timeline of mergers and acquisitions to provide the reader with a descriptive setting for the following case study chapters.

The fifth chapter of the research thesis discusses the research methodology for the two bank case studies, including case selection and research procedures.

The sixth and seventh chapters address the two individual banks that are profiled in the case studies. Each chapter contains a comparison to the overall industry figures, case study information, an organizational analysis, and preliminary conclusions.

The discussion of the findings, both quantitative and qualitative, are in chapter eight, followed by a final chapter with conclusion for the research project and with suggestions for further research. These chapters are followed by the references and appendices.

1.6 Research Contribution

The research covers both strategy, through the concept of competitive advantage and IS, through the concept of deployment of technology. Even within a very limited number of organizations, it undoubtedly may prove difficult to document all aspects of the research model. The research contribution is, however, part of an effort to understand the interfaces between IS, performance, the organization's strategic needs, and the aspects of management.

Chapter 1

Introduction and Research Methodology

Chapter 2: Synthesis of Literature on Financial Services Market and the Impact of IS in Organizations

To appreciate the interest that Belgian retail banks have in technology for productivity and profitability gain, it is important to understand both the market drivers in the banking industry and the role of IS in the financial services market. The purpose of this chapter is to provide a background on the external environment faced by retail banks during this period, and a substantive understanding of the organizational infrastructural issues addressed in looking at the role of IS in the financial services organization.

This chapter also presents a synthesized review of previous literature for each research question. A description of the method used for the search for research literature can be found in Appendix B.

2.1. European and Belgian Banking Market Drivers

2.1.1. Market Change and European Monetary Union (EMU)

The European banking industry is in the process of change. Along with other financial-sector activities, formerly protected domestic banking markets are being opened to competition. As a result, banks throughout Europe are undergoing the most far-reaching process of consolidation and restructuring of the post-war period. The pace of mergers and acquisitions has accelerated and banks that have long been in trouble are disappearing more rapidly. This European phenomenon carries echoes of wider international trends. Following an unprecedented wave of cross-border mergers and acquisitions, a handful of huge global institutions seem prepared to dominate the scene.

In anticipation of the expected lowering of barriers to competition among financial institutions within the European Monetary Union (EMU), many EMU countries, such as Belgium and Germany, have recently experienced consolidation of their domestic banking industry. One reason for this consolidation is the belief that larger banks will be better able to adjust to the needs of the customers when they will be allowed to set up branches in any other country, subject only to the regulations of their home country. As domestic markets become more competitive, current differences in costs and productive efficiency among the banking industries of EMU countries will largely determine each country banking structure and future competitive viability.

It is widely agreed that EMU will significantly affect the degree of competition in the banking sectors of countries adopting the Single Currency, due inter alia to heightened disintermediation, as discussed below, and increased actual and potential cross-border competition. These tendencies are expected to put banks' profitability under significant downward pressure and enhance forces leading to restructuring and consolidation. In anticipation of the expected lowering of barriers to competition among financial institutions within the EMU, many EU countries have recently experienced consolidation of their domestic banking industry. One reason for this consolidation is the belief that larger banks will be better able to adjust to the needs of the customers when they will be allowed to set up branches in any other country. subject only to the regulations of their home country. As domestic markets become more competitive, current differences in costs and productive efficiency among the banking industries of EMU countries will largely determine each country banking structure and future competitive viability. Thus, it is important to know how different or similar are current banking costs and productive efficiency between countries in order to predict increase in cross-border competition, the effects of the expected

European Monetary Union is expected to act as a catalyst to the structural trends already under way in the EU banking systems as a result of other factors (such as financial liberalization, disintermediation and technological change). In particular, these trends can be characterized as follows:

- a reduction in existing excess capacity;
- an increase in pressure on banks' profitability;
- an increase in competition; and
- the spread of internationalization and geographical diversification.

In particular, EMU is expected to reinforce the current tendency in the EU banking systems towards a reduction of banking capacity. Notwithstanding the measurement problems for bank capacity, there are good reasons to assume that excess capacity exists in several Member States. This can be regarded as the result of imperfect competition and/or regulation in the past. There has already been a reduction in capacity in many countries over the past few years. However, EMU is expected to exert, through increased competition, further pressure towards the reduction of excess capacity. In particular, the branch network and staffing levels, given the existing marked differences across countries, are likely to be affected, thus enabling banks to achieve efficiency gains.

EMU requires banks to reconsider their strategies in order to be able to cope with the challenges posed by the single currency. This process is already under way throughout the EU banking systems; it gained momentum, in particular, following the decision concerning the Member States which would participate in the Euro area from the start of Stage Three. Indeed, EU banks are currently responding with improvements in services and procedures, changes in the range of products supplied to customers, as well as mergers, strategic alliances and co-operation agreements. The extent to which the recent wave of mergers and acquisitions in the EU banking sector has been triggered by the advent of Monetary Union is difficult to assess, since similar activity can be observed in other markets (e.g. in the United States). Whereas most mergers and acquisitions in the European Union have so far taken place at the domestic level, the possibility cannot be ruled out that some of them were intended to provide a basis for further cross-border expansion. The comparatively low degree of concentration within the EU banking sector as a whole could provide room for further consolidation.

In respect to the EMU and banks, most commentaries on the financial market consequences of EMU (see for example De Bandt (1999), ECB (1999)) are that it will have the following effects on banks and banking competition:

From a structural point of view, *disintermediation* may increase after EMU via the following channels:

- increased attractiveness of commercial paper, bond and equity finance to companies relative to bank loans (owing inter alia to integration – at varying speeds - of money, bond and equity markets and the reduction in crowding out of private bond issuance by government bonds);
- an increased supply of equity and high yield bond finance as a consequence of corporate restructuring; if firms fear a greater incidence of asymmetric shocks to individual Euro economies, this may also stimulate firms to issue shares to increase the robustness of their balance sheets;
- reflecting integration and greater liquidity, EMU will increase the attractiveness of securitized products (repos, bonds) as an asset for the non-financial sector relative to bank deposits, so banks may need to attract a greater proportion of more costly wholesale finance (CDs, interbank deposits, bonds);
- it may stimulate over the long term the funding of pensions, which may amplify the above effects of EMU (Davis, 1998);

Disintermediation will therefore affect banks' comparative advantage in the longer term;

 EMU may more tentatively reduce domestic banks' comparative advantage in information gathering, since credit characteristics of corporate borrowers in a given industrial sector will become more comparable across countries;

Interbank competition is also likely to increase :

 competition for deposits may increase owing to the scope for cross border banking; competition for loans to smaller borrowers may remain weaker owing to the importance of idiosyncratic information. However, the technological developments in respect of remote and internet banking may be particularly important, and will also affect small banks having hitherto some local monopoly power;

 there could be increased competition across border and from outside the Union for other types of non interest income, notably correspondent banking, underwriting, trading and asset management; multi-national enterprises may rationalize their banking relationships;

At the same time, one can anticipate changes in financial-market and macroeconomic Condition, some of which may be partly adverse to banks:

- lower inflation in some EU countries may tend to put banks' interest margins under downward pressure;
- EMU will reduce directly some sources of non interest income such as foreign exchange transactions and income from trading in some related derivatives contracts;
- EMU may reduce overall day-to-day financial market volatility in integrated Euro markets relative to their domestic forerunners, although peaks in volatility cannot be ruled out;
- there should also be some favorable effects; EMU may also bring about faster economic growth, which should benefit banks and borrowers.

Legal, fiscal and regulatory barriers as well as differences in consumer preferences may still imply some degree of segmentation among banking sectors, the incidence of 'regulatory capture' will be reduced further by EMU, as idiosyncratic national regulations should be eliminated progressively by the scope for cross border banking. Cartels and oligopolies among banks that regulated competition and minimized "customer poaching" will also break down.

One relevant question is how competition will be affected by the macroeconomic environment. Low profitability, in particular due to the transitional costs of the changeover may stimulate price wars and challenge established banking alliances. It may lead to cycles in the competitive structure. Recent market reports suggest such a pattern of heightened competition could be present in France, where market commentators reported that spreads fell in Autumn 1998 despite the impact of the Russian default and failure of LTCM on market confidence.

On balance, these EMU effects seem likely to increase the scope of disintermediation as well as intensifying competition for traditional banking products from within the sector. Cost cutting will likely come to the fore. According to analysts, it is no longer a question of "cost plus profits equals price" but "price minus cost equals profits", as banks become price takers, close to a situation of perfect competition. There may also be intensified competition for non-interest income, where competitors include not only other EU banks, but also US investment banks, which are highly skilled in asset management, credit risk evaluation and securitization. In connection with the existing decline in profitability, there would seem to be grounds for heightened vigilance on the part of regulators, and a heightened willingness to allow mergers in order to reduce potential spare capacity.

2.1.2. Strategic Drivers of Change

Current developments in the EU banking systems show that the strategic responses by the EU banking systems cover three main areas, notably: (i) improvements in services and procedures; (ii) changes in product ranges; and (iii) mergers, strategic alliances and co-operation agreements. The first strategic response takes various forms. First, the pursuit of a better quality of services, staff and IS. However, the hiring of welltrained staff at a time when the banking system is confronted with high staff costs might be difficult. Second, banks aim to improve risk management and internal control systems. Third, they attempt to cut costs and improve efficiency (e.g. lean management and increased use of technology in the retail business) in order to enhance profitability and/or to increase the shareholder value. Finally, banks resort more and more to outsourcing.

The second strategic response is aimed at broadening the range of products and services supplied to customers. The most recurrent observed developments are: a shift from operating services to consulting; a reconsideration of product ranges (selective or expansionary); the seeking of alternative sources of income (geographical
expansion, asset management, corporate finance and payment services). In this context, it is also observed that banks operating in universal banking systems have, in general, not yet decided to withdraw from any major field of activity in view of EMU. In general terms, the "universal banking concept" of offering a full spectrum of services may offer opportunities with regard to using resources more efficiently, if one business activity is temporarily less occupied than another. Furthermore, the information or know-how achieved in one line of business may be used in others to attract and hold customers ("relationship banking"). Another advantage of the universal banking system is the possibility of cross-subsidization, which, however, due to increased competition, specialization and market transparency will also come under pressure. A need for specialization may nevertheless exist, even more for smaller institutions that are required to master activities already characterized by a high level of competition, thus increasing the need for strategic partnerships.

The third line of strategic responses includes mergers, strategic alliances and cooperation agreements. The reasons vary from cost and efficiency improvements (economies of scale and scope) to diversification effects with reference to products (bancassurance), alternative distribution channels (electronic banking) and geographical expansion. In addition, in some EU countries, the reason is linked to the need to develop EU regional players (e.g. in Nordic countries).

With specific regard to the economies of scale and scope, it should be noted that various studies carried out on the matter in the United States over time indicate that the responses are somewhat inconclusive (i.e. Brand and Duke, 1982; Bresnahan, 186; Franke, 1989; Hitt, Frei, and Harker, 1998; Harker and Zenios, 1998). In particular, signs of economies of scale and scope are of limited importance and often restricted to smaller institutions, whereas they tend to disappear for larger institutions. Beyond a given threshold, economies may even result in diseconomies, as additional expenses incurred in the management and control of very large organizations seem to exceed the cost advantage by size. In addition, conclusions drawn from the US situation might not be valid for the EU situation, given the difference in the underlying banking structure and profitability. Nevertheless there seem to be indications of possible economies of scale and scope within the EU financial sector.

In particular, the application of new technologies in banking entails heavy investment expenditure, which can often be made profitable only by a sufficient number of transactions. A larger size permits a more efficient organization of resources, and small banks are less able to achieve a high degree of division of labor owing to the small size of their business. EMU is likely to change the critical mass with regard to break-even volumes, which will differ depending on the kind of target market. Studies carried out in recent years also indicate that a positive relationship between profitability and size (in terms of total assets) is not a general rule. By contrast, reliance on past performance may not prove very useful in evaluating strategic decisions to be made in order to cope with the upcoming challenges, with special regard to EMU.

2.1.3. Competition in EU Banking

To understand the process of financial integration and convergence in Europe, it is necessary to know more about the competitiveness and the efficiency of banks in different European countries. This has to take into account the potential differences coming from both some country-specific aspects of the banking technology and from the environmental and regulatory conditions, for example. In particular, the economic environments are likely to differ significantly across countries and these differences could induce important differences of bank efficiency through different channels. For instance, differences of the income per capita, or differences of the density of population across countries could produce significant differences in the nature of the demand for banking products and services.

There have been a number of studies [Fecher and Pestieau (1993), Pastor, Perez, and Quesada (1995), Allen and Rai (1996)] looking at cross-country banking efficiency, mainly focusing on environmental and regulatory factors. However, they have made assumptions about the use of technology in these markets being a relative constant. The main assumption of these cross-country studies is that the common frontier is built under the belief that the differences in efficiency across countries only come from bank managerial decisions. These studies are assuming that the mean difference in efficiency is located in differences of technologies. However, it is possible that the underlying technologies of the banking services productions in Europe and other developed countries are quite similar.

The differences in efficiency across countries have to take into account the way in which banking services are produced. This production process is determined by country-specific differences-that are almost always excluded from cost and efficiency analyzes-and not only by technology differences. Just as different relative prices of capital and labor inputs will result in different intensity of the use of these inputs in the production process, if the bank minimize costs and if the technology is constant, different national environments will result in different observed inputs, liabilities, and assets mixes and number of branches, again if the technology for producing banking services is constant. If the country-specific variables are an important factor in the explanation of the efficiency differences, then the frontier we obtain if we neglect this factor will generate an overestimation of the inefficiency levels. If the regulatory and economic environments faced by financial institutions are likely to differ importantly across countries, the cross-country comparisons of these studies are difficult to interpret. It is because in these papers the specification of the common frontier is not correct due to the fact that they do not take into account the influence of the country-specific environmental variables that will justify the use of a common frontier in cross-country comparisons of efficiency.

Both in Europe and elsewhere, the growth of domestic and international capital markets (linked partly to the rise of institutional investors) encouraged highly-rated corporate borrowers to shift much of their demand for debt finance from banks to markets, leaving the former with higher-risk credits. In addition, the scope of public as opposed to private information and the efficiency of its use by markets was increased by the development of information technology and the related growth in influence of rating agencies, investment banks and credit assessors covering a wider range of firms. The traditional comparative advantages of banks in this area resulting from economies of scale in information gathering, screening and monitoring (Diamond, 1984) were thus eroded, even abstracting from price considerations. Meanwhile on the liabilities side of banks' balance sheets, wholesale depositors such as corporate treasurers and institutional investors tended to be ready customers for repos, commercial paper and other money market instruments rather than bank deposits - and individuals had attractive opportunities to hold money market funds, in each case undermining banks' comparative advantage in liquidity provision (Dermine, 1991). Both of these trends are leading to a decline in banks' traditional on-balance sheet business.

Such disintermediation was combined with financial liberalization – and in particular for Europe, the Single Market Program - innovations and technical developments that enhanced competition also for traditional banking products such as mortgages, consumer credit and deposits, between domestic and foreign banks, vis-à-vis nonbank financial institutions (notably insurance companies) and with non financial players such as department stores and car companies. Together with capital market disintermediation, these impacted strongly on banks' margins and made it difficult for banks to operate with their traditional mix of business alone. In effect, banks were left with a problem of "excess capacity" owing to the shift towards a more competitive market (Davis and Salo, 1998), and have tried various forms of internationalization to combat this.

Internationalization can take a number of forms. One is via cross-border branches and subsidiaries. Although large-scale entry into foreign banking markets in Europe is still scarce, reflecting persisting legal, cultural and conduct-of-business barriers. (Padoa-Schioppa, 1999).

Another way to spread banking activity beyond national borders is consolidation. Cross-border mergers or acquisitions still seem to be the exception, although things have started to change. The recent wave of "offensive" and "defensive" banking consolidation has mainly developed within national industries, thus significantly increasing concentration, particularly in the smaller countries, such as Belgium.

2.1.4. Domestic Risk and Product Expansion

Most banking activity in Europe, particularly in retail banking, has historically remained confined to national markets. In many European Member States the number, and the market share, of banks that operate in a truly nation-wide fashion is rather small.

Although banks' international operations have increased, credit risks are still predominantly related to domestic clients, and the repercussions of bank failures are usually predominantly felt by domestic borrowers and depositors. The sources of banks' risks and stability issues depend on ongoing trends that are not necessarily caused by the Euro and European Monetary Union (EMU), but may be significantly accelerated by it (Padoa-Schioppa, 1999).

As "multi-product" firms, banks operate simultaneously in many markets which have different dimensions: local, national, continental (or European) and global. Competitive strategy for banks should include a plan for achieving sustainable competitive advantage over, or reducing the edge of, its adversaries. In Porter's view, the performance of individual corporations such as banks is determined by the extent to which they cope with, and manipulate, the five key 'forces' which make up the industry structure, which include for Belgian banks:

- Entrants such as foreign players entering the market,
- Substitutes in the form of new delivery alternatives for retail banking, such as non-banks and Internet banking
- The changing regulatory dynamics changing the role of retail banks
- Regulatory and market changes, which give customers more choices, and
- Consolidation of the current market players.

Using the traditional Porter (1980) graphic below, it can be seen that the advent of the Euro is likely to enlarge the market for many banking products and services to the continental dimension; this will "internationalize" even those banks that remain "national" in their branch networks and organization (Padoa-Schioppa, 1999).



Figure 2.1: Porter (1980) Five Forces Model of Competitive Drivers

Drivers within the domestic markets have banks investing in technology for many reasons, not only to reduce transaction costs, but also for competitive advantage to improve service quality, increase product variety and methods of distribution, speed up responsiveness and enhance customer service. Banks also invest in technology out of competitive necessity (Clemons, 1991), in that, given the structure of the industry and its evolution, technology is necessary to be in business and competitors already

use technology to provide the required products and services in the marketplace. But even if banks invest in the same technology for either competitive advantage or competitive necessity, the implementation of that technology in the organization would be different, based on the organizational structure, and can depend on many different organizational variables.

To maintain or enhance profitability in an environment of decreasing margins, all banks will increase their efforts to reduce costs. On the product side, the disintermediation process is expected to speed up. As a consequence, the traditional system of universal banks could be somewhat changed: A partial retreat of savings as well as co-operative banks from investment banking, accompanied by increasing market shares in the branch-based retail business. For commercial banks, the consultation-intense investment business is very attractive. On the retail sector, a specialization on direct banking allows for additional customers from abroad as well as for high growth rates in the brokerage business (Padoa-Schioppa, 1999).

Banks have responded partly by increasing their focus on non-interest income – including asset management income per se, mutual funds and insurance – and reducing excess capacity by merger or branch closure. However, not every country has responded in the same matter due to differences in the internal economic climate. For example, Belgium has responded to the pressure by mergers with foreign banks and with insurance companies, using 'bancasssurance' trying to mop up the "excess capacity" by economies of scale (Davis and Salo, 1998).

2.2 Trends in Financial Services

2.2.1. Europe's new banks: The non-bank phenomenon

The nature of competition in retail banking, and in retail financial services more generally, could be radically changed by the movement to electronics. Consumers will have access to more information, from more competitors, in a faster time, than ever before. Banks, non-bank providers of financial services, and technology companies will all, at least to some extent, be trying to establish the primary relationship with the consumer, while in some cases providing services to one another or perhaps even selling each other's products. For some people, with a traditional view of retail banking, this new marketplace for retail financial services will be very confusing at times, with: (1) banks and non-banks offering similar products, and (2) banks and technology companies forming alliances to solve certain problems, at the same time the banks remain concerned about the intentions and motives of some technology companies (Patrikis, 1997).

Non-bank financial intermediaries (NBFIs) comprise a mixed bag of institutions, ranging from leasing, factoring, and venture capital companies to various types of contractual savings and institutional investors (pension funds, insurance companies, and mutual funds). The common characteristic of these institutions is that they mobilize savings and facilitate the financing of different activities, but they do not accept deposits from the public (Vittas, 1997).

NBFIs play an important dual role in the financial system. They complement the role of commercial banks by filling gaps in their range of services. But they also compete with commercial banks and force them to be more efficient and responsive to the needs of their customers. Most NBFIs are also actively involved in the securities markets and in the mobilization and allocation of long-term financial resources. The state of development of NBFIs is usually a good indicator of the state of development of the financial system.

Contractual savings institutions, namely pension funds and life insurance companies, are by far the most important NBFIs to-date. Among developed countries, the main factor explaining differences in the state of development of contractual savings has been the existence or not of a social security system promising more or less generous pensions and operating on an unfunded, pay-as-you-go basis. The countries of Southern Europe, from Portugal to Turkey, fall under this pattern as well as Germany, Belgium and Austria.

The main conclusion from the research of Vittas (1998) is that NBFIs complement the services provided by banking institutions and also represent

a countervailing force to their dominant role, forcing them to be more competitive and efficient. NBFIs provide a strong stimulus to the development of the capital markets, generating large amounts of long-term financial resources, and creating new sources of supply and demand for marketable securities. For leasing, factoring and venture capital companies, which mostly deal with financial professionals or, at worst, businessmen and entrepreneurs, the main precondition for their creation and growth is enactment of an enabling regulatory framework, including a clear and supportive tax treatment. Openness to foreign participation to ensure availability of the specialist skills and transfer of financial technology and know-how would also be very helpful. If such companies provide loans to consumers, or obtain funds from non-professional investors, they should be subject to the same consumer and investor protection regulations as other financial institutions. The promotion of pension funds, insurance companies and mutual funds requires more fundamental changes and presupposes the existence of a more robust and elaborate regulatory and supervisory framework. In particular, the establishment of private pension funds may also depend on the implementation of more basic and systemic social security reform.

2.2.2. Electronic Banking

The Belgian banking sector has always been a pioneer in the field of electronic banking for companies. The PC boom in the 1980s meant that practically every bank started developing software programs to create payment orders to send to banks. Shortly afterwards, new applications followed, such as the retrieval of bank statements, the processing of encrypted bank statements (CODA), the entry of direct debits and checks and the consultation of various types of financial and economic information. Already in the early 1990s, tens of thousands of companies did their banking transactions electronically on a daily basis. Although, technically, there were already a number of Belgian standards around (such as the CIRI standards and the

TRASEC security system), every bank, up to now, used to develop its own system, with its own procedures and standards. If you happened to work with various banks, this diversity constituted a serious problem. Consequently, clients increasingly called for uniform standards and procedures, and one functional interface.

In response, the some of largest Belgian banks (BBL, Generale Bank and Kredietbank) began talks in 1994 about a technological standard. Eventually these talks resulted in the development of a multi-banking electronic banking platform, i.e. the Isabel project. Half a year later, three public limited companies were incorporated. IsaServer S.A. for the management of the central computer center with all its functionalities, IsaNet S.A. for the management of the telecommunication network and IsaSoftware S.A. for the development and implementation of the required user software. In the autumn of 1995, Isabel had seven shareholders: the three companies that took the initiative plus the ASLK Bank, BACOB, CERA and the Gemeentekrediet.

Isabel has taken on new roles since its inception, and has been moving into ecommerce. Belgian authorities have chosen Isabel as the secure channel for the electronic exchange of administrative information (eGovernment). Some examples of applications set up in collaboration with Isabel include electronic recruitment declarations (DIMONA) and VAT declarations. Isabel is the foremost Belgian Class-3 certification authority -- Class 3 is mandatory in Belgium for making payments and for exchanging documents electronically with the public authorities. It is also required for any confidential communication between companies, authorities, institutions and citizens.

2.3 Role of IS in Financial Services

The banking industry is one of the oldest users of information technologies—in the early 1950s in the U.S., Bank of America was the first commercial user of mainframe technology. Yet the global banking industry reflects most of the empirical dilemmas associated with measuring the impacts of IS: heavy investments in IS; slow (or no) visible improvements in productivity until relatively recently; and impacts that reflect

quality improvements, rapid product diversification, and substantial growth in volume of commercial transactions.

IS has clearly changed both the structure and service quality of banking, and appears finally to have a positive impact on cost reduction. But it has taken decades to achieve these results, and traditional productivity analyzes are mixed on what positive associations exist between IS investments and productivity in the commercial banking sector.

The structure of the banking industry is changing rapidly, making it more difficult for banks to differentiate based on service alone. In the short term, services such as electronic banking will have to compete based on price and product as well as the service offerings. In the long-term banks may need to position themselves differently in the value chain to survive.

IS uses are diverse in the banking sector, and can be seen throughout the bank's value chain, as shown in Figure 2.2.





Initial applications included accounts management and check processing via magnetic ink character recognition. Automated clearinghouses, which enabled electronic funds transfer (EFT), were introduced in the early 1970s and ATMs in the late 1970s. EFT, ATM, and telephone transaction capabilities have replaced a wide variety of paper and in-person transactions in banking, including account deposit and withdrawals, accounts management, credit applications and approvals, cash dispensing, funds transfers, point-of-sale transactions, credit card payments, and consolidation of banking operations.

2.3.1. IS and Change Management

A growing body of research has identified the link between the adoption of information technologies and corresponding changes in the structure of organizations. These changes range from shifts in human capital requirements (Griliches, 1969 Berndt et al., 1992) to changes in decisions about whether to "make" or "buy", as information technology lowers the transaction costs of outsourcing what was previously produced internally (Brynjolfsson et al., 1994). Some have even suggested that a complete re-engineering of the business process is required to fully take advantage of IS innovations (Hammer and Champy, 1993).

BPR in itself was not revolutionary, but that it resulted in an increased awareness of the fact that there are multiple aspects to be taken under consideration when initiating change projects – strategy, technology, processes, and people. This intention, to provide a more holistic approach, instead of sub-optimizing isolated elements of the organization, can be considered as the main contribution BPR has delivered to the world of change. In addition, BPR has a clear focus on what must be done, instead of what hasn't been done. The conclusion to draw might be that many companies have been over-emphasizing on specific aspects such as information technology, while disregarding the need of integrated change in all the dimensions under concern. Whatever the ultimate fate of Business Process Re-Engineering, business processbased <u>change</u> is here to stay. In bringing about such change, however, one needs to be sensitive to the detailed context in which it takes place - process-based change in the chemicals industry, for instance, is a very different proposition to change programs in the construction industry.

In the financial services sector, rather than leading to conditions for a creative and committed staff, process change has tended to be driven by cost cutting considerations. There is much to learn about business process change, also seen as BPR, from innovative financial institutions. Many of these institutions have introduced innovations in process involve the use of information technology. The content of financial products is information. Products are "constructed" using

processes using information technology extensively. Thus, innovations in the technology such object-oriented programming and knowledge-based systems are likely to result in both process and product innovation. Many non-financial organizations can learn a great deal about process innovation and the potential contribution of information technology from financial institutions.

There are dangers, however, of focusing too much on the technological part of a process. Information systems developers have a tendency to focus on what they call the logical aspects of processes. The logical aspects of a process are the essential characteristics of the process stripped of human idiosyncrasies and foibles. Humans are often seen to add unnecessary complexity and ambiguity. Inevitably, over concern with the logical aspects of processes results in processes that have little place for the human qua human. Processes require robot like consistency and precision from their human components. As a result these reengineered processes often do not exhibit the expected performance improvements and may even breakdown completely. We still have much to learn about reengineering business processes and the work that breathes life into these processes.

On the whole Davenport (1993) is a much better starting point for thinking about reengineering work that is Hammer and Champy (1993). Another set of perspectives on designing and redesigning work is provided by a collection of articles in a past edition of the Communications of the ACM (Suchman, 1995).

Work by Prahlad and Hamel (1990) has already directed our attention to identifying the core competencies of an organization and being able to focus on the future potential for such competencies. Pisano and Wheelwright (1995), among others, note that process competencies are often a lasting source of competitive advantage. Many have argued that we need to look for breakpoints in product or service in the characteristics of services or products. These quantum leaps of performance change to nature of the competitive market place and can often arise as a result of innovations in the underlying business processes.

The more organizations learn about their core processes the more they will be able to link such knowledge to redefining market offerings. This, in turn, will make their competitive position stronger and more defensible. Organizations that can intimately integrate their core processes with those of their suppliers and customers often build an even stronger competitive position. This is very much the insight behind Normann and Ramirez's thinking. Even if we do not directly integrate our core processes with our suppliers or customers we must take care that our own reengineering of core processes is not wasted. Being able to manufacture and deliver a product in one day rather than two weeks may make relatively little difference to the customer who stockpiles product for six weeks. Similarly, reengineering processes providing a service so that far more flexibility is available gives little advantage if the customer cannot comprehend the increased flexibility or make adequate use of it in adding value to his/her own business processes).

IS researchers have expressed time and again that technological change poses the greatest challenge to their research (Teng & Galletta, 1991). Perhaps it is that IS should be studied as an independent variable affecting the organizational structure. Huber (1990) recommends a reassessment of certain components of organization theory which are affected by the tremendous changes that have occurred in the capabilities and forms of communication technologies.

IS is one of several enablers, including human resources and organizational change, that all must be considered together to bring about change in business processes. These enablers need to be identified early in the process so that the design process includes their capabilities from the beginning. The enablers such as IS need to be analyzed to determine their relevance to the change process as well as weighing the costs versus the benefits. For IS in particular, the capabilities should influence process redesign, not just complement or support the process.

The other role IS plays in the business change process is that of implementer or facilitator. There are several key activities where IS can play a facilitation role :

- Identifying and selecting processes for redesign
- Identifying enablers for process design
- Defining business strategy and process vision

- Understanding structure and flow of current process
- Measuring performance of current process
- Designing and prototyping the new process
- Implementing and operationalizing the new process and associated systems
- · Communicating ongoing results of the business change effort
- Building commitment to process change

Identifying and selecting processes for redesign requires gathering and analyzing information about the performance and structure of a process. IS can aid the analysis process with the use of tools that provide modeling and flow simulation, analyze survey data, and perform structuring evaluation. All of these help increase the amount and quality of information available to the design effort and utilize the informational and analytical capabilities of IS.

IS can also be used to help identify other enablers of business change. Expert systems and technological databases can provide information on current and future capabilities of technology, human resources, and organizational change. Often times these facilities provide quick access to large amounts of useful information. The knowledge management, informational, and analytical capabilities of IS are useful for this activity.

Defining business strategy and vision requires understanding the company's strengths and weaknesses, and the market structure and opportunities. An existing Executive Information System (EIS) can provide good insight into the existing conditions. The capabilities of IS to disintermediate, track information, and break down geographic barriers are especially useful in this step. IS tools that facilitate open, creative discussions through the use of computer conferencing, electronic communications, groupware, and image processing systems are often very useful.

Finally, building commitment and maintaining enthusiasm during the process change is facilitated with IS through the use of electronic communication, project management tools, and process analysis tools. Communications technology helps to overcome geographic barriers and thus enable broader acceptance of the process change. Project management and analysis tools facilitate tracking and managing expectations against commitments so that all involved parties are aware of what is to be delivered in the end product.

Aside from playing a part in the actual change effort, the IS organization has another critical role that impacts process change success. The IS organization must build a technological platform that will enable process specific applications to be developed quickly. The platform must include a standardized architecture, extensive communication capabilities, and shared database access. This infrastructure will enable coordination of the overall effort and support continuous process change.

Organizations are amalgamations of interdependent work processes, built of sequential flows of tasks and activities (Hammer & Champy, 1993). Tasks and activities constitute the primary building blocks of work and represent the elemental data about work processes. Information serves to coordinate these tasks and activities and strings processes together to form end-to-end workflows. Work units and their comprising work processes are measurable with performance metrics, with feedback information returning to the work process for real-time process reconciliation. "Facts" about work and work organization can be collected through careful examination of existing work and analysis of customer requirements. These become input data to the change planning process, to be manipulated and optimized under the rational logic of business organization (Venkatraman, 1994).

The view of IS-enabled change as a general strategic model circulating in the broad managerial discourse enhances our understanding of the interpretive flexibility of IS use and the rich social and political character of organizational IS, Cultural models of managerial discourse have validity because they explain how coherent, broad-based representations of strategic innovation can exist. They identify specific linkages of the general management discourse to local technological implementation efforts. Cultural models provide a socially diffuse basis of shared meaning for business consultants, business organizations, and journalists and scholarly writers on which to engage ISenabled change. Perhaps most importantly, understanding the highly abstracted characterizations of organizational IS as cultural models reveals much about the

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critical assumptions and implications of IS and work change within the organizational setting.

2.3.2. IS and Competitive Advantage

IS research suggests that the use of innovative information technology (IT), deployed globally with the right mix of organizational assets, may help firm performance by increasing scale and scope economies, customer value, operational efficiency and organizational effectiveness, and by providing opportunities for competitive advantage (Peffers and Tuunainen, 1998).

IS for competitive advantage started to be a key issue for management in the mid-1980s (Brancheau & Wetherbe, 1987). Arising from the work of Michael Porter (1980, 1985), we were given a vision of IS being used in a proactive way in changing the very nature of competition (McFarlan, 1984).

As the 1980s wore on, questions began to surface about the sustainability of any advantage that might have been achieved through the judicious utilization of IS (Clemons, 1986) and the interest in the topic waned (Niederman, et al., 1991). In much the same way, although still a key component of the process, we now see the centrality of IS in process change / BPR also being questioned (Davenport, 1993) and the success of IS in process change being questioned (Senn, 1992).

As a result, by questioning the role of IS in both BPR and process change, management has tried to assess if radical change is always needed, and if IS always plays a role in that radical change. A starting point to the consideration of the role of IS in process change is a view that IS strategy should be but one aspect of business strategy and should be looked at in a broader sense. For example, Lederer and Sethi (1992) perceive IS strategy as being concerned with the identification of required IS applications and the necessary resources to develop these. All too often, when considering IS strategy, strategic thinking is confined to outcomes associated with required applications and necessary resources, rather what possibilities may exist outside of that scope. In the same way that business has traditionally focused on the formulation rather than the implementation of strategy, IS has focused on IS strategy.

During this period when IS for competitive advantage was in the spotlight, with IS strategy focusing on strategic IS (Porter & Millar, 1985), the view was that IS/IS could improve and actually create new products and services, leading to a refocusing on the business (Ventrakaman, 1991), and acting as a catalyst in radically reengineering business processes (Davenport & Short, 1990; Hammer, 1990).

However, in the early 21st century, we have come to acknowledge a more multifaceted approach to business change, understanding that the organizational environment, business strategies and processes, and the information infrastructure all play a part in change management. In understanding that key stakeholders in the organization have to be favorably disposed to change for change strategies to have a chance at success is a significant change from the works of Hammer (1990) where the radical change of BPR involved senior management and outside consultants only.

Therefore, the role of IS in competitive advantage and process change is now more of a gradual one, focusing more on the implementation than the overall strategic view of IS in the organization.

Effective change management depends on recognizing complements among technology, practice, and strategy. Interactions play a critical role in affecting outcomes, a role that leads to new analysis and theory (Barua, Lee and Whinston, 1995; Milgrom and Roberts, 1988). In developing a theory of complements, Milgrom and Roberts show mathematically how interactions can make it impossible to successfully implement a new, complex system in a decentralized fashion. Instead, managers must plan a strategy that takes into account and coordinates the interactions among all the components of a business system. Furthermore, because new organizational paradigms eliminate time, space, and inventory buffers, operations become more tightly coupled. These linkages further aggravate change management problems and process interactions (Rockart and Short, 1989).

An old proverb states that "you can't cross a chasm in two steps." The same wisdom applies to many organizational change efforts. Advances in information technology (IS) and rising competition have led to new modes of organizing work. Because success often depends on coordinating the right technology, the right product mix, and dozens of the right strategic and structural issues all at the same time, near misses can leave a firm worse off than if the change had never been attempted. While several studies have documented the importance of coordination (Jaikumar, 1986; Krafcik and MacDuffie, 1989; Parthasarthy and Sethi, 1993), managers continue to have difficulty achieving it. Often, the problem is not that the proposed system is unworkable but that the transition proves more difficult than people had anticipated (Champy, 1995). Too often, managers proceed in a hit-or-miss fashion, implementing the most visible bits and pieces of a complex new system, unaware of hidden but critical interconnections.

2.3.3. IS Strategy and Growth

How then can an organization make an assessment of the quality of its IS resources and decide what urgent action it should take in its strategy planning? This is not simply an assessment of the strategic impact of IS as in MacFarlan's (1984) analysis. A broader evaluation is required and this can be achieved by a development on the well-known "stages of growth" concept (Gibson and Nolan, 1974; Nolan, 1979) which incorporates the so-called "7S" analysis pioneered by McKinsey & Company (Pascale and Athos, 1981). This broader stages of growth model is described in detail in Galliers and Sutherland (1991) and lessons from its application are recounted Galliers (1991). The stages of growth model is also used in a generic change management decision model in Brugha (1998). Brugha focuses on the structure of qualitative decision-making, adjustment decision-making, and development decisionmaking which provide the basis of the Nomology, the study of decision-making processes of the mind.

Galliers research represents the 'growth in IS maturity' in an organization as having six stages, most of which are development stages. Galliers uses McKinsey's "Seven Ss" (Peters and Waterman, 1991; Waterman, Peters and Philips, 1980; Waterman, 1982) as a basis for describing the sixth developmental stages in detail. These "Seven Ss" are: style, skills, the super or data Bulls, strategy, staff, structure and systems. McKinsey's style corresponds to the different habits that companies form over a long period, representing different ways of considering new propositions. A consequence of this is the need to develop a procedure for dealing with each new situation. In time these procedures become reused and can embody some of the company's culture or style. In the context in evaluating organization's "growth in IS maturity", a company's style is not as interesting at the procedures it uses to valuing new ideas, IS, software, business processes, etc.

Galliers' model is used for identifying how far an organization has developed on the road to IS maturity. In using McKinsey's "Seven Ss", the emphasis is on visible outputs which are relevant to a consulting organization. Brugha (1998) suggests more generic adjustment activities, as to strictly focus on development aspects.

In mapping the stages of IS maturity of Belgian banks, a wider ranging study would have to be done, looking at all of the banks over a longer period of time, as to see how the development of both the market and the banks has evolved.

2.4 Question 1: Are there measures that can assess how banks effectively utilize IS investments?

2.4.1. Previous Literature on Productivity Measurement

In the long run productivity is the primary determinant of our standard of living and the economic resources available to address societal challenges and problems. Understanding whether and how computers affect economic productivity is a critical issue for policy makers as well as business leaders. In 1987, the economist Robert Solow quipped, "We see the computer age everywhere except in the productivity statistics" (Solow, 1957).

The measurement of the impact on productivity growth of technological change has been of major interest at least since Solow's (1957) seminal article. Subsequent

literature in the field has used research and development (R&D) expenditure or patent in activity at the firm or industry level to proxy technological change (Mairess and Sassenout (1991),Griliches (1990)). Since publication of Loveman's 1988 provocative study in which it is reported finding no productivity growth from increases in IS capital spending, a body research has been accumulating which examines from a variety of theoretical and methodological perspectives the phenomena generally referred to as the IS productivity paradox (Brynjolfsson, 1993). The key question for which there does not seem to the any simple answers is: Are for realizing adequate returns on capital investments in Information Technology? Does money invested today in new IS produce a return equal to or better than money invested in other capital assets?

Unfortunately, the empirical evidence available for formulating a response remains highly contradictory. It has not yet produced costs with a tested explanation of the causal relationship between IS investments and economic benefits, suggesting the need for continued research and model building.

A selection of applicable research studies that assess the effects on service industries of IS investment on economic and strategic performance are summarized in Table 2.1. The major criterion used in selecting this particular set of studies is that performance is measured in terms of productivity, profitability or competitive advantage.

Author	Unit of Analysis	Performance Construct and Measure(s)	Input Measure(s)	Type of Analysis	Key Findings
Franke (1987)	Industry (insurance and banking)	Productivity (ave. labor)	Total IS Capital Stock	Econometric (1958-1983)	Declines in capital productivity associate with specific technological innovations
Harris/Katz (1990)	Firm (40 life insurance companies)	Operating cost efficiency (operating expenses/premium income)	IS expense ratio & IS cost efficiency ratio	Correlational Time Series (1983-1986)	Top performing firms had higher growth in IS expense ratios and lower growth

Table 2.1: Selected Research on Economic and Strategic Impacts of IS in the Area of Financial Services

Synthesis of Literature

					in operating expense than weak performers
Bender (1986)	Firm (132 life insurance companies)	Operating cost efficiency	Total IS Expenses	Correlational cross-section (1983)	Higher IS spending associated with higher unit cost efficiency
Banker/ Kauffman (1988)	Firm /SBU (508 branch banks)	Competitive advantage (as defined by marginal bank branch deposit share as contribution to reducing costs)	 Presence of ATM at a branch Connection to regional shared ATM network 	Econometric cross-section	-Use of ATMs enabled branch to protect rather than grow market share - Bank customers evidenced "willingness to pay" for regional access to shared electronic banking network externalities
Alpar/Kim (1991)	Firm / SBU (759 banks)	Productivity (multi- factor)	 Total IS expenses Labor Capital Time Deposits 	Econometric Time series cross-section (1979-1986)	 10% increase in IS associated with a 1.9% decrease in total costs. IS contributed to reduction in demand deposit amount and an increase in time deposits. IS is capital using and labor saving.

In the study of 508 branch banks, Banker and Kauffman (1988) report no evidence of market share growth derived either from ATMs at branch banks or by association with a shared regional electronic banking network. They reported evidence that depositors are willing to pay for network externalities that accrue when a bank is connected to the regionally dominant bank, suggesting a potential competitive advantage.

A few studies have considered the role of technology in the banking industry. Alpar and Kim (1991) examined the cost efficiency of banks overall and found that IS investment was associated with greater cost efficiency although the effects were less evident when financial ratios were used as the outcome measure. In a study of 759 banks, Alpar and Kim (1991) found that a 10 percent increase in IS expenses led to a 1.9 percent decrease in total bank costs. Prasad and Harker (1997) examined the relationship between technology investment and performance for 47 retail banks and found positive benefits of investment in IS staff. These studies, however, did not consider how this IS contribution or level of investment varies across firms. Brynjolfsson and Hitt (1995) found that "firm effects" can account for as much as half of the contribution of IS found in earlier studies. Recent results suggest that at least part of these differences can be explained by differences in organizational and strategic factors.

In theory, the decision of a firm to adopt new technology should be determined by profitability criteria. The profit gain generated from the introduction of new technologies will arise either from cost reductions or from increases in revenue, or some combination of both (Stoneman and Kwon, 1994). But a fundamental difficulty in evaluating computer systems in general arises from problems in quantifying actual benefits (Sassone, 1984, Gotlieb, 1985). IS is capital investment applied to information activities. All the difficulties in measuring service sector productivity apply to the measurement of the impact of IS. The white collar support activities which IS augments are, typically, not like commodities that are traded within market price setting mechanism. The advantage in banking is that most IS investment is applied to automating the primary 'production' processes rather than clerical support activities, thus the impact on production costs is more direct and can be more readily measured.

Another problem for banks and other enterprises is in allocating costs. Specific computerization projects for business units may be cost justified, based on the incremental computer resources they consume, but these types of projects can depend on prior investment in large-scale IS infrastructure which is usually not specifically cost justified, but is a necessary investment for operations. Analysis of internal business cases indicates this is certainly true in the case of banking.

2.4.2. Transaction Costs

Banks track the cost of a transaction much as a manufacturing company would look at cost of goods sold. IS has affected the cost of transactions, through greater standardization, information flow/information compactness and increased globalization. Information technology also helps firms contract is size because it can reduce transaction costs, as well as internal management costs (Laudon and Laudon, 2001). Standardization of information exchange creates an expected transaction interface, reducing cost. Greater information flows and information compactness means that significant information may be transferred at minimal cost, with this information referring to multiple (but precisely defined) attributes of the good traded.

IS has also significantly affected market globalization, which also enhances market functionality, through the provision of numerous opportunities on both the supply and the demand side, and allows "market" transactions to occur closer to a global optimum. Effectiveness is associated with the more "traditional" transactions-cost concerns, specifically those of transaction risk acquired as an undesirable but unavoidable consequence of feasibility and efficiency, as well as transactions cost arising from misalignment of incentives. Effectiveness should thus determine the sustainability of any organizational / procurement / network transactional arrangement. The degree of asset redeployability and the frequency / recurrence of transactions, as well as the magnitude of reputational effects, are the key variables in understanding effectiveness. In several of the above-cited instances, IS has directly modified, either mitigated or enhanced, such risks.

The cost effectiveness of IS, as opposed to human asset costs, has been an active point of debate within the banking industry. What is currently a concern for the banking industry is lowering the human cost in a transaction, since it is neither standardized nor considered optimally efficient. Given the generally acknowledged overbanking at the level of the Belgian branch networks, the human involvement factor (including social charges and other employment benefits) per transaction is higher than in most other countries, not providing a competitive advantage against cross-border competitors. The issue of permanent versus temporary outsourced staff for IS, also as a human cost element, is also debated in terms of IS resource policy. Some banks prefer to use only their own resources for security reasons; others add external aid where needed. This can be considered both a transaction cost issue as well as a discussion of asset deployment and the proprietary nature of banking IS. Coase's classic article, The Nature of a Firm, argues that the existence of firms paying permanent salaried employees, as opposed to hiring temporary workers from the spot market, cannot be explained except in the presence of transaction costs. The costs of relying on the spot market to provide workers needed for frequently performed tasks make it more efficient for workers to hire permanent salaried employees. Williamson's Markets and Hierarchies relies upon a similar transactions cost argument to explain the decisions of firms to perform tasks internally or purchase them from independent contractors.

Ronald H. Coase's paper on "The Nature of the Firm" introduced transaction costs as the primary reason for the existence of firms. More than 2 decades later, he wrote "On the problem of Social Costs," which revolutionized the way in which economists perceived market and non-market solutions to the problems of externalities. In this paper, Coase argued that the problems of externalities cannot be examined without looking at the institutional setting of the problem and the size of transaction costs.

A transaction cost is a cost of using a market. "There are negotiations to be undertaken, contracts have to be drawn up, inspections have to be made, arrangements have to be made to settle disputes" (Coase 1993, p. 715). In 1937, Ronald Coase began a quiet revolution in economic theory, by asking the innocuous question: why do firms exist? Coase wondered why if, as competitive market theory suggested, the price system perfectly coordinated the provision of goods and services, we would have units called firms and individuals called managers, supplying still more coordination.

His now-famous answer, greatly elaborated by Oliver Williamson in his "Markets and Hierarchies" research, was that firms existed because in the presence of transaction costs, the price system could not in fact provide all the coordination required to transact business anew for each project and enterprise, across a "market" boundary. Coase pointed to the "costs of using the pricing mechanism. What the prices are have to be discovered. There are negotiations to be undertaken, contracts have to be drawn up, inspections have to be made, arrangements ... to settle disputes ... It was the avoidance of the costs of carrying out transactions through the market that could explain the existence of the firm in which the allocation of factors came about as a result of administrative decisions..." (1993: p. 230).

Coase's question was unique because it recognized that among the fictions of classical economics, the depiction of economic agents as always acting alone rather than cooperating with others in a defined social unit was especially misleading. A parallel to Coase's 1937 question is another of at least equal significance, which asks about firms what Coase asked about individual economic actors: why do they coalesce into identifiable social structures? That is, why is it that in every known capitalist economy, firms do not conduct business as isolated units, but rather form co-operative relations with other firms. In no case do we observe an economy made up of atomized firms doing business at arm's length with other firms across a market boundary, any more than we observe individuals trading with one another to the exclusion of firms. It is collections of co-operating firms, referred to as "business groups".

The difficulty is that these "why" questions are syntactically disposed to teleological or functionalist answers -- that firms exist in order to reduce transaction costs, for example. In the case of firms, it is urgent to add the "how" question: "how is it that in circumstances where profits could be made from the formation of a firm, actors are in fact able to construct one?". Once this question is posed, we are alerted to the fact that the assembling of economic elements into a firm is a formidable act of organization; it is a good example of what Schumpeter defined as "entrepreneurship" -- the pulling together of previously unconnected elements for an economic purpose (Schumpeter 1926).

Historically, the discipline of economics has been weak on theories and empirical accounts of entrepreneurship (Blaug 1986), because of its assumption that profitable activities automatically take place, as summed up in the aphorism that "you will not find money lying in the street". But in fact, empirical studies make clear that there are many circumstances where although it would profit actors to construct firms, social

structural difficulties -- especially the absence of trust in the relevant social group -make this difficult or impossible (Granovetter 1992).

For business groups, where the task of construction is even larger than for firms, the "how" question must also be asked: what makes possible the agglomeration of firms into some more or less coherent social structure, and what determines the kind of structure that results. The "why" question has in fact been addressed in several literatures. Four answers to why firms might want to connect with one another are:

- "resource dependence" -- firms are rarely self-sufficient and may form alliances or connections with other firms upon whom they regularly depend for resources (Pfeffer and Salancik 1978).
- the need for "strategic alliances" among firms which is said to derive from the changing nature of markets and of consumer demand (Piore and Sabel 1984);
- the need asserted by Marxist analysts for coalitions of capitalists to form against other societal interests, or for one sector of capitalist firms (typically finance) to ally against others (Mintz and Schwartz 1985);
- the desire of firms to extract "rents" from the economy or the government through coalitions, over and above those that could be achieved in a properly competitive economy.

Like the transaction cost account of why firms exist, all these focus on what motives economic actors have to be linked, or on how their economic outcomes will be improved by such linkage. Knowing such motives is certainly a crucial part of understanding the origins of business groups, but stops short of illuminating the likelihood that such linkages will occur; to achieve an understanding of the scale at which economic co-operation occurs requires us to move beyond the comparative statics of economic environments in equilibrium to consider how economic actors construct these alliances, and this task require a serious examination of how actors mobilize resources. Only the combined analysis of incentives and possibilities will yield a satisfactory account.

2.4.3. Productivity Measurements and Banking

Reviews of the traditional U.S. econometric productivity literature indicate that IS investments by the banking industry do not systematically result in measurable, positive productivity impacts. Major cross-sector studies (Brynjolfsson and Yang, 1996) do not detect positive productivity returns for IS in the banking industry, and Franke's (1987) study of the financial sector (insurance and banking combined) suggests that IS is associated with negative productivity impacts. However, Brand and Duke (1982) do find productivity growth of 1.3 percent per year attributable to computers. Using qualitative evidence and interviews with chief executive officers, the U.S. National Research Council attributed the lack of productivity impact to a variety of factors. One is the ever present measurement issue: measures of output in the banking industry are extrapolated from employment data by the U.S. Bureau of Economic Analysis and estimated from indices of financial transactions (loans, deposits, and so forth) by Bureau of Labor Statistics. Neither procedure fully accounts for the volume of banking transactions or wider variety of financial services, etc.

Note, however, that U.S. labor productivity has been steadily improving in the U.S. banking industry. Morisi reports that "during the 1973-93 period, commercial banks had the highest long-term growth in productivity than any of the measured finance and service industries" (Morisi, 1996, p.30). The difficulty is in empirically linking these improvements to IS.

A second reason for the apparent lack of IS-led productivity growth in this industry relates to problems with early generations of information technologies and organizational adaptation. The National Research Council study reported that: "early applications of IS proved to be costly and cumbersome. Software and equipment had to be updated and replaced frequently...IS systems required large amounts of tailoring, training, upgrading, and updating. Cost control, management skills, and productivity tracking systems lagged behind the new technologies in a rapidly changing competitive marketplace...The result was that tangible paybacks from IS investments were delayed." (NRC 1994, pp. 80-81).

The significance of IS emerges in areas of business impact other than conventionally measured productivity gains. Three types of effects are worth particular note: the expansion of banking products and services, time and cost savings, and competitive positioning. Banking products and services have proliferated with the use of EFT, ATM, telephone transactions, and automated credit and loan procedures. Banks thus process billions of transactions a year—everything from clearing individual checks, to ATM cash dispersal, to account inquiries, to loan approvals—a volume of interactions that would simply not be possible without automation. For example, the Clearinghouse for Interbank Payment Systems was processing nearly \$2 trillion worth of transactions increased from 30,000 per day in 1978 to 1.4 million per day in 1991 (NRC 1994, pp. 83-84). Bresnahan (1986) estimates that the benefits to consumers of the use of mainframe computers for financial services was five times greater than the investments in the computers themselves.

The qualitative improvement in customer convenience, ease, and scope of access to financial resources is reflected in the overall growth of electronic transactions. Time and cost savings for the industry are also notable. For example, Mellon Bank reduced the average processing time of customer complaints by 20 days when it installed an integrated document system; Visa reduced its processing time for electronic credit card authorizations from 5 minutes in 1973 to 1.1 seconds in 1991; and the Bank of Boston reduced its staff requirements by 17 percent and increased its transaction volume by 80 percent when IS allowed the bank to consolidate its mainframe operations (NRC 1994, pp. 83-84). The American Bankers Association estimates that ATM transactions cost 27 cents compared to \$1.07 for a human teller, and telephone transactions cost about \$0.35 compared to \$1.82 for a phone call processed by bank personnel (Morisi 1996).

Although the productivity measures do not find a link between banking industry output and IS investments, it is important to note that while the volume of financial transactions has been increasing at a dramatic rate, employment in the sector has been falling. By 1996, employment in the U.S. commercial banking industry was 100,000 employees below its historic peak in 1990. During the same period, the number of ATM transactions doubled to more than 10.5 billion.

IS is of value to the banking industry not only for time savings, cost reductions, and customer services, but for the ability to give individual banks a competitive advantage or the ability to maintain a competitive position. Deregulation of the industry in 1980 led to intense rivalry among institutions, and expanding automated services was one way of attracting depositors and customers. Thus Banker and Kauffman's (1988) study of 508 branch banks found that ATMs were essential to maintaining market share and customer base—not necessarily to reducing costs.

The banking industry illustrates many of the issues involved with establishing useful metrics for analyzing the economic impacts of IS. Not only are there problems with measuring the output of this industry in a meaningful way (productivity estimates require output estimates), but there is the issue of what to measure in the first place. IS clearly provides "value added" in a range of consumer and producer activities that are not captured by productivity analysis, such as convenience, scope of services, access, time savings, transaction volume, and transaction cost reductions. The challenge is to select one or two representative measures of impact and track their performance over time.

The industry may have experienced a long learning curve in terms of adaptation to new information technologies. Insight into how banks reengineered their organizations, management strategies, and work tasks could inform IS strategies in other industries and shorten the lag between the time a technology is introduced and the time it begins to measurably enhance business performance.

2.4.4. Definition of Competitive Advantage

Competitive advantage is normally defined as the ability to earn returns on investment persistently above average for the industry (e.g., Porter, 1985). The ability of any innovation to contribute towards competitive advantage, therefore, depends on the innovator receiving a larger share of the economic benefits from the innovation than competitors or incurring a lower cost (investment) in implementing the innovation that competitors (Clemons and Row, 1991). There is also competitive necessity (Clemons, 1991), which dictates investment as to keep up with the rest of industry. Generally, even banks who focus on innovation because of industry pressures are also looking for competitive advantage gains from that investment, however small.

Innovations, in general, create economic value by decreasing the costs of existing products or services, improving their quality, or creating new or enhanced products or services. It is clear from the work of Porter (1985) that successful competition using innovation depends on a combination of factors including the exploitation of technological change. Innovations may be classified by either type, such as product innovations or process innovations, or by source (internally or externally developed). Some firms are likely to be in a better position than others to improve their competitiveness through the appropriate selection of innovative activities.

Wiseman (1988) has developed a framework for looking at strategic information systems which is primarily based on Porter's (1985) theories. Wiseman defines a strategic information systems (SIS) as "a use of information technology intended to shape or support the competitive strategy of the enterprise" (p. 18). According to Wiseman, there are five major methods for attaining competitive advantage through a SIS:

- 1. Developing a differentiated product, service or image for the firm
- 2. Reducing costs
- 3. Creating innovative products or processes
- 4. Permitting growth in products or functions
- 5. Facilitating alliances with other organizations

However, although Wiseman's book (1988) is full of examples of SIS, most of these are services. He overlooks the importance of developing and implementing effective information systems within strategically important subsystems. The only substantial point Wiseman makes is regards to R&D's strategic role in organizations and the importance of its contributions, not IS's role in the R&D process itself.

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McFarland (1984) also discuss five opportunity points that address the impact of IS as a strategic resource in the organization. The questions asked include:

- 1. Can IS technology build barriers to entry?
- 2. Can IS technology build in switching costs?
- 3. Can the technology change the basis of competition?
- 4. Can IS change the balance of power in supplier relationships?
- 5. Can IS technology generate new products?

This points are extensions of the Wiseman methods, although Wiseman looks at the positive impacts, and McFarland also includes the negative issues, such as barrier to entry and balance of power.

There are two different ways of utilizing information technology to have a strategic impact on a company. One route is to develop a new and dramatically better solution to a business problem - a solution that would not be available without information technology. This sounds familiar, that in BPR, Hammer and Champy also initially preached radical change. The other route to achieving strategic impact is for an organization to utilize existing information technology more effectively than its competitors. This is not as glamorous or dramatic, but can be more effective.

In terms of the fifth method of Wiseman's framework (1988), the earlier thinking on competitive advantage, and the role IS can play in its achievement, focused mainly on aggressive behavior. There is now a growing realization that collaborative alliances are likely to play an important part in improving business performance: one should not expect the best of service from a supplier, for example, if their relationship with one's own company relies on the sole fact they have no other current alternative customers. Interorganzational systems (IOS) have become more commonplace in the last few years, and collaboration is a definite part of the strategy that makes it work. Miles and Snow (1992) discuss the various components of the network and their roles in making the network work that voluntarily improve the product or service rather than simply fulfilling a contractual obligation.

The Miles and Snow typology has been utilized by many researchers but only few have attempted to validate it (Shortell and Zajac (1990), Parnell and Wright (1993)). Both Miller (1986) and Ketchen et al. (1993) have compiled lists of constructs and variables used to define strategic typologies and groups in the literature which suggest that the timing of innovation adoption, as gaining advantage from IS, is not included explicitly in any of the strategic typologies developed in the strategic management literature.

Competitive advantage from IS is based on two properties of business processes - IS's strategic relevance to a firm's strategy and the information intensity of the processes of the organization. First, organizations exist because they have expertise. A process is the ability of an organization to perform some activity. Thus business processes are the building blocks of a firm's competitive strategy. However all processes are not equally important. Business processes in an organization that cannot be substituted by using processes acquired across a market are the firm's strategic processes. A firm owes its competitive advantage to such strategic processes. The second property of business processes that is of interest to us is the processes' information intensity. Organizations process information to reduce uncertainty. This uncertainty comes from at least three sources - environmental uncertainty, the characteristics of business processes, and process interdependence. The higher the level of uncertainty in a process, the greater the information processing requirement in that process. Processes with high information processing requirements can be categorize as information intensive process or process with high information intensity. Information technology has a greater impact on processes with high information intensity than on processes with low information intensity.

Information systems that support processes that are strategic and have high information intensity have a greater impact on organizational performance compared to information systems that support processes that are either non-strategic or have low information intensity. The business value of IS investment is not equal across processes and that the strategic importance and the information intensity of the process determine the business value of IS. This process view of strategic information systems can present a new perspective to the theory of strategic information systems, helping organizations in prioritizing their IS investments and maximizing the impact of its IS investments on business performance.

2.4.5. Sustainability of Competitive Advantage

The rise of information technology (IS) has driven a great deal of speculation, theorizing, and investigation regarding the potential this technology has for providing companies with competitive advantage (Clemons & Row, 1988; Porter & Millar, 1985). Both conceptual frameworks and anecdotal case studies have been used to argue that IS can generate competitive advantage by providing easier access to markets, creating product differentiation, increasing customer dependence through prohibitive conversion costs, and providing cost efficiencies. Despite cautions that opportunities to achieve sustainable competitive advantage through IS may be rare (Clemons and Kimbrough, 1986), IS researchers have maintained that by adopting specific firm strategies and ensuring favorable industrial conditions, sustainable competitive advantage can be achieved (Clemons & Row, 1991; Kettinger, et al., 1994). Their work, shows empirically that, such factors as industry competitiveness, technological and organizational slack resources, and risk management strategies are important determinants of sustained strategic IS outcomes. In contrast, resource-based theorists have challenged the ability of IS to provide a sustainable competitive advantage. In general, resource based theory posits that sustained competitive advantage derives from resources that are rare, valuable, non-substitutable, and imperfectly imitatible (Barney, 1991).

The concept of IS as a powerful competitive weapon has been strongly emphasized in literature, yet the sustainability of the competitive advantage provided by IS application is not well-explained. Mata, Fuerst and Barney (1995) discusses the resource-based theory as a means of analyzing sustainability and develops a model founded on this resource-based view of the firm. This model is then applied to four attributes of IS -- capital requirements, proprietary technology, technical IS skills, and managerial IS skills -- which might be sources of sustained competitive advantage.

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From this resource-based analysis, they conclude that managerial IS skills is the only one of these attributes that can provide sustainability.

Today, successful competitive strategy and corporate results are likely to focus on a small number of performance attributes including speed, flexibility, quality and scale. All four areas of strategic focus are profoundly affected by an organization's effective use of information technology to facilitate, enhance and accelerate strategic execution. The traditional view of information technology's (IS) role in competitive strategy is largely reactive - that is, a response to existing competitive strategy and business process, but not a critical factor in shaping that strategy and process. A more sensible approach is to position IS in a pro-active role where the competitive strategy is not viewed as a prior given, but rather as something that should be challenged, extended and perhaps modified, in light of emerging technologies and applications.

Sustainability of competitive advantage may be achieved by leveraging unique from attributes with information technology to realize long-term performance gains, Information systems that cannot sustain competitive impact have only transient strategic value or may offer negative value if matched by a superior response by competitors. A research review of sustainability was conducted by Kettinger et al (1994) that resulted in the development of a framework depicting factors effecting sustainable competitive advantage. This study evaluated longitudinal changes in performance measures of 30 firms that have been cited as "classic" cases of strategic use of information technology. The results of this analysis indicate that not all of these classic cases can be touted as "sustained winners." Differences among strategic "sustainers" and "non-sustainers" were formally tested to determine those firm and/or industry factors that may be antecedents to sustained IS competitive advantage. Results indicate that managers must do more than simply assess the uniqueness or availability of emerging technological innovations in developing strategic IS plans. Specifically, the establishment of technological base along with substantial capital availability seem to be important prerequisites of "technologically derived" sustainability.

There is no doubt that the impact of IS is significant. However, "the real challenge is not technology (adoption) per se, but the ability to adapt to take advantage of its emerging functionality" (McKenny 1995, p. 37). Reaping the full benefits of IS adoption requires not only a full understanding of IS applications and their potential but also a readiness to change, all of which points to the importance of mobilizing human resources and constantly improving technical capabilities.

Moreover, as more and more firms successfully adopt and implement IS applications, the comparative competitive advantages derived from the adoption of these applications may very well disappear if firms do not stay ahead. For firms that lag behind, IS adoption becomes merely a question of survival.

This partially explains why contradictory results concerning the impacts of IS adoption have been observed. IS adoption as such is a necessary but not sufficient condition for increased productivity, key competitive and strategic benefits, and stronger financial and export performance.

According to Clemons and Row (1991), information technology can lead to sustainable competitive advantage when it used to leverage differences in strategic resources. In this way, strategic resources can explain the allocation of economic benefits from an IS innovation. This may be true even in cases where duplication is relatively easy and there are few dynamic effects, such as first-mover advantages, to protect the innovation. An important characteristic of IS is its ability to manage interactions among economic activities; economic theory can be used to establish a link between this characteristic of IS and shifts in resource values. This permits the identification of opportunities for deploying IS to leverage structural resource differences among firms, including differences in vertical integration and diversification as well as differences in the quality and organization of key resources.

2.4.6. IS in terms of the Organization

In terms of organizational change, competitive advantage can be defined as change to various forms of organizational structure or organizational behavior as to gain advantage in the marketplace. The value of the competitive advantage gained by IS can be derived from the contribution of IS to the attainment of the goals of the
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organization. The situation where IS adds this value to the organization may not be so clear if:

- There is an uncertainty about what causes the benefit. For example, strategic
 investments may contribute to the competitive position of a company, but other
 organizational changes may have been more important to achieve this. In cost
 benefit analysis, this problem could be overcome by giving a monetary value to
 this type of benefit, based on several different valuation schemes (Farbey et al.,
 1993).
- The benefits of IS could be difficult to measure, requiring multi-objective multicriteria methods to enable the decision maker to rank options that are measured on different value bases (Farbey et al, 1993).
- There may some uncertainty / discrepancy about the goals themselves. Different relevant stakeholders may disagree on which goals should be attained, therefore requiring evaluation methods to take into account consensus building (Farbey et al, 1993).

The variety of situations where IS is deployed requires contingency approaches, since there is no one best method for evaluation. In their research in measuring the economic value of IS, Van Wegen and de Hoog (1996) discuss a model of the production process that also could be adopted to discuss the valuation of the level of competitive advantage brought about by IS. The modeling methods is as follows:

- Determine relevant processes
- Define activities
- Define activity relations
- Estimate relative activity costs
- Estimate activity relation costs
- Determine changes in production digraph
- Derive potential cost reduction
- Derive feasible cost reduction

The differences in looking at competitive advantage versus a production process cost reduction is that IS can also change other elements in the production of the product or service in effect, such as different delivery channels, enhancements to the product or service, or adding to an alliance.

The establishment of linkage between business and IS objectives has consistently been reported as one of the key concerns of information systems managers. Benbasat and Reich (1996) clarify the nature of the linkage construct in their research. According to their research, the linkage construct has two dimensions: Intellectual, where the content of IS and business plans are internally consistent and externally valid, and Social, where the IS and business executives understand each others' objectives and plans. Based on the data from the research, they conclude that an understanding of current objectives and shared vision for the utilization of IS are proposed as the most promising potential measures for social linkage. Understanding of current objectives and shared vision for the utilization technology are proposed as the most promising potential measures for short- and long-term aspects of the social dimension of linkage, respectively. With some precautions, selfreports may also be used as a surrogate measure for short-term linkage.

Increasingly, researchers realize that the relationship between IS investment and firm performance is complex and multifaceted. Some contend that measurement problems, methodological deficiencies, and poor quality of data sets may have contributed to the so-called productivity paradox of information technology (Li and Ye, 1999). Others suggest that since IS investment is inherently related to company strategy, the relationship between IS and firm performance should be studied within a strategic management framework. While both ideas are sound, the latter points at a very important and promising direction of IS research. One of the research areas to assess is how does a firm's IS investment and environmental, strategic, and managerial factors together influence firm performance. Research by Li and Ye (1999) suggests that companies considering IS investment should assess their environmental contexts, strategic directions, and top management team arrangement to allow CIO's a more strategic role. Their study attempted to determine the links between three key contextual factors and IS's performance impact. They proposed that a firm's external

environment (depicted primarily by the degree of environmental change or dynamism), its strategic orientation, and its integration of IS into the overall strategic picture of the firm would influence the business value of IS investment. Their analysis provided evidence support of these hypotheses. Their findings suggest that the understanding of the IS- performance relationship can be significantly expanded if taken into consideration the impact of key contextual factors. This may help remedy the problems that have resulted from the relatively simplistic conception of a direct relationship of IS and performance.

2.4.7. Measuring Competitive Advantage from Organizational Elements

Since competitive advantage from organizational change can be defined as change to various forms of organizational structure or organizational behavior as to gain advantage in the marketplace, therefore to measure competitive advantage gained from IS in organizational change requires knowledge of what has changed and how the change has impacted either productivity or profitability of the organization.

One approach to measuring IS's impact on business value (another way of looking at gaining competitive advantage) is to focus on areas within the organization where value is created. Crowston and Treacy (1986) suggest that the specific value of IS is determined by the strategic objectives or business goals for which the technology is deployed. Correspondingly, the motivation for deploying IS suggests the best method for evaluating performance impacts. Berger (1988) supports this view, arguing that the criteria for measuring an information system's impact should vary with the rationale for its application. Similarly, Kauffman and Kriebel (1988) suggest that a way of coping with the diversity of potential impacts from IS is through a classification of IS applications that facilitates selection of appropriate measures by type, such as administrative cost reduction, productivity improvement, customer service enhancement, or new product strategies.

Various researchers have argued for adopting a process-oriented view of IS business value since IS impacts are realized at the process-level (Crowston and Treacy 1986; Bakos 1987; Kauffman and Weill 1989; Wilson 1993). However, where process-oriented studies have appeared (Banker and Kauffman 1988, 1991; Banker, Kauffman

and Morey 1990), their application has centered on specific technologies thus limiting the generalisability of their findings to other technologies and organizational contexts. This observation led Mooney, Gurbaxani and Kraemer (1995) to develop a processoriented framework of IS business value based on the notion that organizations derive business value through the impact of IS on intermediate business processes. This framework centers around operational processes that comprise a firm's value chain and management processes involving information processing, control, coordination and communication.

2.5 Question 2: What impact does the organizational structure have on the IS output performance?

2.5.1 View of Organizations and IS

The second question requires us to see organizations not as machines that can be taken apart and analyzed functionally. One need to consider organizations as a place for social interactions (Hirschheim, 1992; Robey and Boudreau, 1999). The failure of IS applications can be created by people conflicting mental models (it is called 'conflicting frames' in this paper) which they use to perceive problems and deliver actions. The more human actors are involved in the use of IS, the more organizational issues they may bring into being. This can be seen as the human-induced complexity of change.

The present literature seems to advance the normative approach of IS-enabled change in two ways. First, the system dynamics approach (e.g. Sterman et al., 1997) highlights the causal complexity underlying the IS-enabled organizational change, where analysts need to be alerted to the reciprocal causal effect. For this purpose, it is more important to examine the underlying causal pattern rather than applying linear causal analysis. Secondly, the sociological tradition explains the influence of humaninduced complexity. When human actors play an active part in IS applications, it is important to investigate the dynamics of organization. For, to resolve the problem of IS failure, it is necessary to examine the intricate interaction between human actors, apart form the rational causes (such as systems incompatibility problems). Otherwise, one may only observe superficial symptoms and not be able to see the root cause. What is missing in current literature is to consider a situation where analysts confront both high causal and human-induced complexity. An exception is the use of structuration theory (Giddens, 1984) in understanding the implication of technology in organizations (see, for example, Lyytinen and Ngwenyama, 1992; Orlikowski, 1992, 1993; Orlikowski and Robey, 1991). This perspective considers the interaction between the use of technology and human actors, which conditions, and is conditioned by, the social structure.

2.5.2 Organizational Design

Today IS is at a pivotal point. It comes out of a tradition of techno-centered thinking, language and methods, and of poor mutual understanding between technical specialists and business managers. It is embedded in more and more areas of business operations but not yet embedded in the business management process. It has moved out off a long period when technology was risky and too often did not work to a period where we have more technology then we know how to use. It is shifting from a tradition of computing, where telecommunications was a an add-on, to one of integrated technology platforms, where telecommunications provides the highway system into which computing applications fit.

Business managers are moving from a tradition where they could avoid, delegate, or ignore decisions about IS to one where they cannot create a marketing, product, international, organizational, or financial plan the does not involve such decisions. But IS has a unique characteristic that has the power to alter an industry's competitiveness and the nature of interfirm rivalry. This characteristic is IS's ability to create "interrelatedness" among firms, markets, and products. In conventional markets, a permit products and services and alone. Of course, they are judged by comparison with rivals' offerings, and the extent to which they are better, or just different, may determine market shares. The impact of the unique IS characteristics is subtle: although in some circumstances it acts to exacerbate existing competition and can turn a traditional rivalry into a winner take all battle, in other circumstances it can soften existing competition, even occasionally turning rivalries into co-operative ventures.

Organizations consist of the following elements: work, structure, processes, people, rewards, decision-making and information (Kalakota and Whinston, 1993). Design is the process whereby the designer balances organizational elements to achieve results. It is a daunting task to adequately balance the IS design elements with the organizational design elements to create efficient processes. The future of IS lies in untangling this intricate web and finding solutions for organizational problems.

Within organizational design, there are structural associations between organization in IS. In general, organization to grow and mature, they tend a move towards more mechanistic systems, thereby losing flexibility and adaptability. However, when environments become more competitive and turbulent, organizations need return to more adaptable, organic structures (Slevin and Covin, 1990). One-way organizations had used to become organic is by downsizing. Even though IS can support organizational downsizing through elimination of the need for middle management for automating routine tasks, generally communication patterns tend to remain unchanged only managerial control becomes more accountable. From this perspective, IS have been viewed by management as a monitoring mechanism, rather than an opportunity for change.

Empirical research has generated contradictory findings on IS-organizational structure relationships. For example, Foster and Flynn (1984) claim that increased utilization of IS creates task-focused interactions and personalized contacts, which lead an organization toward more organic systems. On the other hand, Crowston et al's (1986) computer conferencing case suggests a tendency towards centralization, with more specialized staffs and decisions made higher up in the hierarchy. Contingency studies indicate that IS tends to enhance the existing match of organizational structure with environments. For example, organizations implementing IS become more centralized in less complex environments and with more routine tasks. However, computerization in non-routine past and uncertain environments lead to decentralization. Leifer (1988) suggests matching organizational structures information systems configurations. Similarly, emphasizing proper alignment among structure, the strategy, and IS, Buchanan and Linowes (1980) develop a responsibility based framework for distributing IS resources in which user groups computing capabilities and task

specificity determine the degree of decentralization of IS resources. They claim that effective information systems are those that fit the organizational structure and culture.

There appears to be a reciprocal relationship between organizational characteristics and IS (Premkumar and King, 1994). IS influences organizational characteristics and, at the same time, organizational dimensions affect IS structures, although previous research suggests that there is more emphasis on the impact of IS on the organization than the effects of organizational dimensions on IS structures. Premkumar and King address the ongoing challenge of planning for information systems in organizations by building a contingency-theoretic model linking the quality and effectiveness of the planning process with a set of organizational factors (size, industry, planning time horizon, resources, role of IS in the organization, quality of strategic business planning, quality of facilitation mechanisms, and quality of implementation mechanisms). Their findings suggest that planning success is related to the resources provided for IS planning, the quality of implementation mechanisms, the role of IS in the organization, the quality of facilitation mechanisms, and the quality of the firm's strategic planning.

Decisions about the particular form of IS structure to implement can be influenced by organizational design variables such as formal ovation, specialization, standardization, hierarchy of authority, centralization, and complexity, as well as contextual variables such as environments, technology, size, and goals. Of the contextual variables listed above, one can focus on technology and environments because these dimensions have undergone rapid transformation in the past ten years and perhaps impact IS more than the other factors.

Structure of an organization is the arrangement of organizational subsystems and the accompanying division of labor and hierarchy of authority relations. Organizations differ in their structures for a variety of reasons. One major reason relevant to IS is that organizations differ in their need for information interchange based on the degree of internal and external task uncertainty. They therefore select organizational structure with adequate information processing capabilities.

Common dimensions of organizational structure are:

 Hierarchy of Authority: The traditional organizational structure can be depicted as a hierarchical or pyramidal structure of positions. Each position has authority to command associated with it.

Specialization: This refers to division of labor within the organization. An
organization is divided along functional lines (e.g. marketing, production, accounting
etc.) which encourage specialization within each function.

3. Formalization: The degree of formalization is the extent to which rules and procedures exist to handle organizational activities. One indication of formalization is the degree to which decisions, for handling various situations, are programmed.

 Centralization: Organizational centralization refers to the level in the organization where decision making occurs.

The technological impact of IS may necessitate the change of organizational structure in order to make explicit and to reinforce the relationship needed by the technology for maximal effectiveness. The MIS itself will become the heart of the organization structure and the stabilizing force holding an enterprise together. It will reduce the number of levels within the organizational structure as well as cause the regrouping of activities and the centralizing the control and authority. The impact of MIS will not be identical in every organization. In some cases the structure may shrink to smaller number of levels. Consequently it may experience reduction in the number of middle managers. The total organization is considered a complete communication system whose information flow is funneled through nodal decision-makers in order to improve their performance. When an organization plans to implement IS it should be flexible enough to mold itself into the system. The organization can be restructured to be built around the IS. The hierarchy may or may not be sacrificed.

Some aspects of organizational structure and style as well as specific human resource policies are particularly important to the successful use of IS. For example, an enabling culture and an adaptive organization appear to characterize successful implementation.

Beneath all of this are the organization underlying assumptions about the nature of its employees. Management's assumptions in this regard can encourage or discourage the movement towards the organization as a learning system, a necessary move if organization is to adapt successfully with technology. Many different groups within the organization have an essential role to play in ensuring effective implementation of IS and organizational change. First, top management vision and the presence of a 'product champion' are crucial in this change process. The kind of changes that take place if an organization is to successfully complete organizational transformation require a degree of organizational 'reengineering'. The fact that these changes span the brought an all levels of the organization suggests the active leadership by the CEO is requisite.

Human resource policies play key well in facilitating the development of a new culture and ease and success of introducing specific IS projects. Using these policies as an active component of the change process requires a proactive stance on the parts of the human resource professional and a real partnership with line management.

Maximum feasible participation by users and stakeholders help to bring about the integration and coordination of technology and organizational choices. Each of these groups can help insure that the introduction of IS into an existing organization meet both the immediate business and longer-term of organizational objectives.

The full potential of IS can only be realized if it is associated with corporate changes in the organization and human resource practices. The implementation of IS -adoption, introduction, and diffusion of IS systems -- involves the social and technology development processes. Training has a unique importance in facilitating organizational change and the introduction of new technology. But the resources consumed by training are substantial. Beside explicit expense, such as incurred by classroom education, there is the productivity loss that occurs during initial phases and the learning curve. The implementation process must engage the energies and talents of all who have a stake in the new technology. Consequently, one should consider the respective roles of top management, middle management, users and user representatives, and others who will have influence in the process. The appropriate role for top management is a blend of providing central guidance and encouraging local initiative. Top management should provide a clear vision of the organization wants and delineate the steps to realization of that vision. At the middle of the organization, the stakeholder group that is probably most crucial and most at risk in today's organization is middle management. This group is in the midst of the forces for change: the driver and leadership from the top meets the initiative and involvement from the users below. As the implementation of IS almost invariably requires customizing systems -- what Shimada and MacDuffie (1986) refer to as "workers bringing wisdom to the machine" -- user participation can be a key facilitator.

Within the banking sector, many IS structures emulate the business divisions of the bank. Lateral organizational forms have also been used to foster fluid coordination among these kinds of organizational units by "utilizing structures that range from simple direct contact relationships and liaison roles, through group-based forms utilizing teams and task forces, to formal lateral structures, such as project management and matrix structures" (Joyce, McGee, & Slocum, 1997). Following contingency theory approaches to organizational structures, which suggest that an organization should structure itself in a manner that maximizes its ability to decrease uncertainty in its environment, a number of authors suggest that organizations establish lateral integrative mechanisms to increase their capacity to handle high information requirements and reduce uncertainty in turbulent environments (e.g. Galbraith, 1994; Burns, 1989; Davis & Lawrence, 1977). The benefits of such structuring can be improved lateral management, empowerment of lower level managers, interdepartmental co-operation and decision-making, and improved communications. However, such organizational structures can also incur a number of costs: low functional excellence, low technical expertise, losses in organizational commitment and team performance, high stress and other personal costs (Joyce, McGee & Slocum, 1997).

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One research area that is common to all the levels of integration is metrics and methodology. As things stand today, we have no way of measuring the effectiveness of a particular approach on the enterprise. We still have to develop methodologies which allow the design of organizational processes in tandem with the technological processes. Understanding the business requirements, critical success factors and strategic goals is the key at all levels of integration. What are organizational problems and what are their characteristics? How does technology impact the problem characteristics? Training IS professionals to ask the right questions and eliciting the key information should be a future direction. Only with an understanding of cultural issues, business processes and technology can enterprise integration produce tangible results.

The basic question underlying these sets of propositions is how to design various levels of enterprise integration as open systems where people, business processes, organizational goals and hardware/software components are designed simultaneously. Academically, this translates into an attempt to create a practical theory of socio-technical systems which involves understanding the fit between technology, people, organization and environment for satisfying the organization needs and goals, and the factors that influence the achievement of this fit.

As used in current terminology, technology refers to the application of knowledge for specific purposes. Organizational scientists use the term 'technology' to refer to anything from job routineness to raw materials input. Scott (1991) has argued that to study the technology of an organization, it is necessary to view it as a mechanism for transforming input into output.

This is in line with the definition of open systems theory, and allows us to describe the traditional model of work into basic phases of input (material and information brought into the work place), conversion (the process of transformation of the inputs), and output (products, services or information provided out to the environment). Most organizational research and theory that addresses technology is based on definitions of technology derived from one or more of these dimensions. However, most conceptualizations of technology emphasize the conversion process and ignore its connection with input and output activities. The predominance of attention is given to

the conversion process in research on technology stems from the emphasis given it in theoretical descriptions of technology.

Historically, there are four theoretical models and schemes commonly used in addressing technology in organizations:

- Woodward's study on using technology as an analytical variable, with technology determining organizational structure. First published in 1965, this book is still of practical value and remains an important starting point for the study of all contributions to organizational theory since the mid-sixties. Woodward tested current theories of organization and looked into why some organizational structures appear more successful than others, finding that the relationship between technology and formal structure is important for success.
- Thompson's three-part classification scheme (long-linked, mediating, and intensive technologies), suggesting that the input, output and conversion processes are interlinked and should be geared to each other.
- Perrow's view of technology, which addresses two dimensions underlying routineness: task variability and task uncertainty. Perrow (1967) looked at how the frequency and type of exceptions that occurred during production affected structure.
- 4. The scales developed by Hickson, Pugh, and Pheysey, which the theoretical element defines techniques used by organizations with technology for workflow, such as automation, interdependence of workflow segments, and production continuity.

Out of these four theoretical model, many other organizational research studies (Grimes and Klei, Mahoney and Frost, Morrissey and Gillespie, and Randolph and Finch) have expanded the organizational definition of technology.

In contrast to the classical scholars, most theorists today believe that there is no one best way to organize. What is important is that there be a fit between the organization's structure, its size, its technology, and the requirements of its environment. This perspective is known as "contingency theory" and contrasts with the perspective of classical theorists like Weber, Taylor, and Fayol, who thought that there probably was one way to run organizations that was the best.

2.5.3. Best practices in IS and Organizations

While productivity impacts may be an important element of IS business value defined as the contribution of IS to firm performance (Berger, Kobielus and Sutherland 1988), many researchers now argue that it is necessary to adopt a more comprehensive interpretation of IS business value (Strassmann 1990; Kaplan and Norton 1992; Brynjolfsson 1993).

Firms invest in information technology to create various kinds of leverage on firm profitability and performance. However, IS researchers have concentrated their efforts on the productivity impacts of technology, at the employee, process, firm, industry, and economy levels of analysis, to the exclusion of other business value impacts. Not captured by productivity metrics are the significant benefits that may accrue to the firm as product quality improves, managerial assessment of risk is enhanced, time to market and other time reductions are made, and new ways to control firm input and output prices become available to management. These kinds of impacts reflect price recovery improvements - the ratio of the prices of a firm's outputs (of good and services) to the prices of the inputs it consumes in productions - and they are rarely measured or understood in a systematic way. Duliba and Kauffman (1996) argue that it is appropriate to reconsider the current measurement and research agenda that aims to discover and document the payoffs that accrue from corporate investments in IS. Duliba and Kauffman illustrate in their study of international banking the extent to which IS investment may be motivated by management's understanding of the potential price recovery payoffs (even if they fail to carefully measure or report them) in the context of trading and treasury operations in international banking. Findings included that price recovery captures a previously unmeasured dimension of the business value of IS.

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Various researchers have argued for adopting a process-oriented view of IS business value since IS impacts are realized at the process-level (Crowston and Treacy 1986; Bakos 1987; Kauffman and Weill 1989; Wilson 1993). However, where process-oriented studies have appeared (Banker and Kauffman 1988, 1991; Banker, Kauffman and Morey 1990), their application has centered on specific technologies thus limiting the generalizability of their findings to other technologies and organizational contexts. This observation led Mooney, Gurbaxani and Kraemer (1995) to develop a process-oriented framework of IS business value based on the notion that organizations derive business value through the impact of IS on intermediate business processes. This framework centers around operational processes that comprise a firm's value chain and management processes involving information processing, control, coordination and communication.

An important concept which highlights the role of IS in a company's business processes is the value chain. This divides a corporation's activities into distinct processes necessary for engaging in business activities (Porter and Millar 1985). These include processes such as supplier relations, production, marketing support, and customer relations. Besides being discrete, these processes are also in interdependent. Therefore, how well they perform individually and how well they are linked are important determinant of business value. IS creates value for the business by improving individual business processes, or inter-process linkages, or both. For example, when a firm's production schedule is linked to real time sales data and to suppliers logistics systems, these linkages may not only create production deficiencies that may also markedly improve customer relations through greater responsiveness. In general, the greater the extent to which IS impacts individual business processes and their linkages, the greater the contribution of IS to firm performance.

The impact of IS on these intermediate business processes is a potential source of IS business value. Since the intermediate business processes span the value chain an represent the set of management operational processes where senior executives are likely to concentrate IS resources, combining these processes into a single model effectively creates an organization. Measuring this construct is equivalent to measuring each of its constituent components. Since each component corresponds to intermediate business process, each process is in effect an indicator or dimension of

the business value construct. Hence, this model of IS business value (Mooney, Gurbaxani and Kraemer, 1995) uses intermediate business process variables added indicators. The goal of this analysis, therefore, if to test such a model to determine whether measuring the impact of IS on intermediate business processes provides an effective measure of IS business value. A further goal of this analysis is to test how process level interactions includes business value measurement. Value chain models of organizational processes, suggested an ordering of intermediate processes where value created at earlier stages of the value chain has implications for value adding possibilities further down the value chain. By implication, the impact of IS on a particular process could have downstream effects on the impact of IS on subsequent processes. In effect, they could be likely some degree of interaction between the various processes. Therefore this research suggested not only should assessment occur on the extent to which the impact of IS on individual intermediate business process provides an overall measure of IS business value, but also on how the interaction of IS impacts between intermediate processes influences IS business value measurement.

There has been a substantial body of research on common organizational problems with computer systems (Laudon, 1974; Gasser, 1986; Orlikowski, 1993; Knights and Murray, 1994). A review of this literature indicates that the appropriate theories would have to account for: the social relationships between participants who influence the adoption and use of computer-based technologies, the infrastructures for supporting systems development and use, and the history of local computing developments (Kling, 1987).

In looking at social relations, special attention would have to be paid to informationprocessing views of coordination that assume harmony and cooperation, rather than the possibility of partially conflicting preferences, interests, or values (Kling, 1991; Orlikowski, 1993). Purely technological theories of coordination also tend to overestimate the ability of different subgroups to coordinate quickly and smoothly. The capacity to coordinate can be limited by organizational processes (Beuschel and Kling, 1992; Kling, 1992b). IS has the potential to change the way organizations coordinate. Because the effective coordination of separate activities within organizations and between organizations plays such a large role in organizational performance, it is important to know how organizations use IS to actually coordinate their activities. What coordination problems does IS solve in practice, and what new coordination problems does it bring to the surface? What is easy about turning technological potential into organizational performance, and what is difficult?

There is a long tradition of organizational analyzes of information systems in organizations – how social forces influence their selective adoption, shape their configurations, enhance or undermine their implementation, and influence their subsequent uses (Kling, 1980; Kling 1987). Information-processing views of coordination change show how structural features of IS directly improve organizational performance by simplifying key coordination problems of scheduling, synchronizing, and allocating (Malone and Crowston, 1994). The information-processing approach has special appeal because it gives a way to think about optimizing organizational structures to reduce coordination costs. Information processing formulations, such as Malone and Crowston's, emphasize static, relatively optimal, solutions to organizational problems. This information-processing view, however, gives us an incomplete understanding of how to cope with dynamic organizational problems that arise from changing coordination practices within a world of powerful social and economic logics.

Though a distinction is often made between coordination activity and production activity in organizations (Scott Morton, 1991), coordination itself is an extremely broad term. It is usually defined at a very abstract level, as the alignment of distinct but interdependent activities (Malone and Crowston, 1994). Everything from human communication, to factory scheduling algorithms, to an international currency market can be conceptualized as a coordination problem. An example of organizational coordination difficulties comes from the use of massive, technically complex computer systems that span an entire organization. While a complex system may improve aspects of a firm's coordination, making these systems run smoothly on a daily basis is a huge coordination challenge of its own. These are some of the kinds of issues organizations face in translating the potential of IS into improved organizational coordination. IS, because of its inherent capability to store, process, and transmit vast amounts of information, has rightly been seen as a powerful enabler of new forms of organizational coordination (Scott Morton, 1991). IS alone does not create impacts; its effects reflect a host of decisions made and actions taken by a range of stakeholders including senior managers, technical professionals, and users. To understand how firms actually use IS to facilitate coordination, the first analysis task would be to define a set of theoretical concepts that can account for changes in coordination technology, but within a framework of human decision, behavior, belief, and history. However, the specific ways that IS changes organizational coordination in practice cannot be fully described by inherent technological capabilities such as "reducing time and space to zero." These examples are consistent with previous research on computing and organizations, which shows that the use of IS may lead to different coordination outcomes, depending on existing social and economic logics (e.g., Kling, 1996). The actual coordination changes that take place in the presence of IS is a question might be answered through empirical, behavioral study.

2.5.4 Relationship between Competitive Advantage and Organizational Performance

Recent developments in the resource-based view of the firm reaffirm the importance of studying the strategic consequences of behavioral and social phenomena within a firm, but suggest that separating this work from the content of strategy, or from the competitive context of a firm, is inappropriate. According to the resource based view of strategy, core competencies are those which are firm-specific and inimitable (Amit and Schoemaker, 1993; Barney, 1991, 1992; Dierickx and Cool, 1989; Lado and Wilson, 1994; Snow and Hrebiniak, 1980). Competitive advantage is based on these core capabilities and skills (Prahalad and Hamel, 1990; Wernerfelt, 1989; Amit and Schoemaker, 1993). A core capability is defined as being the ability of the firm to put resources to use, through organizational processes, to reach the ends desired by the firm. Core capabilities can exist in both tangible and intangible formats (Amit and Schoemaker, 1993; Hall, 1992).

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The capabilities perspective on the firm is currently being developed in industrial economics and strategic management theory. In this perspective the firm is considered as undertaking a wide range of activities for which it needs resources. Some of the firm's resources are rare, valuable, costly to imitate, and non-substitutable. The firm that controls such resources can generate above-normal profits, if it prevents rivals from getting direct access to these resources, and from imitating or substituting them. Therefore, such resources can be the basis for sustainable competitive advantage.

There is discussion on the question of how firms can create sustainable competitive advantage based on their resources. Some argue that resources per se are the source of sustainable competitive advantage (among others: Wernerfelt 1984; Barney 1986; Barney 1991; Peteraf 1993). This perspective is known as the resource-based view. Others argue that it is the firm's competence in leveraging its resources that is more important. This could be called a competence perspective (among others: Prahalad and Hamel 1990; Hamel and Prahalad 1993; Hamel and Heene 1994). The capabilities perspective, finally, analyzes how firms develop the resources that underlie competitive advantage. It is thought that tacit, intangible resources such as knowledge, skills, experience and learning-which are the firm's capabilities-are crucial in acquiring and sustaining competitive advantage (among others: Winter 1987; Dierickx and Cool 1989; Teece et al. 1997).

The firm's capabilities are its tacit resources. They are knowledge-dependent and associated with learning processes; they need to be sustained over time in order to prevent them from degradation. They may include, among others: know-how of employees, learning abilities, organizational culture, reputations, and networks. Capabilities cannot be possessed by the firm; they need to be developed, although the firm can acquire their services by hiring the individuals or group of individuals that master the required capability (Chi 1994). It should not be excluded that the firm may want to buy the organizational unit of another firm that has this capability. However, the effectiveness of the transfer of capabilities from one firm to another is likely to be limited. The buying firm runs the risk of not acquiring the desired capabilities, since, being people-dependent "they can walk away" (Hall 1992: 136).

The capabilities approach states that neither the ownership nor control over specific resources per se supports sustained competitive advantage, but rather the creation, maintenance, renewal, and employment of its capabilities (Teece et al. 1997). A difference in focus between the capabilities and the competence perspectives is that the latter emphasizes what the firm's management should do in order to create profits, whereas in the capabilities perspective one tries to understand how the firm develops its capabilities and which role they play in the organizational structure.

As any other resource, capabilities can be a source of sustained competitive advantage. However, they cannot be exploited as readily as tangible assets, since they reside in the know-how, experiences, and skills of the firm's employees and managers (Castanias and Helfat 1991; Kogut and Zander 1992). Some capabilities reside in individual employees but most capabilities are shared between groups of employees. A second reason why they cannot readily be exploited is that the exploitation of shared capabilities supposes that they are integrated in the employees' working routines or the firm's organizational routines.

Since capabilities are knowledge-based, their creation is associated with processes of learning, both at the individual and the organizational level. The tacit character of the firm's capabilities protects them from plain imitation by other firms, which would result in the firm losing its competitive position which is based on these capabilities. Still, other firms might meticulously try to imitate them, but this is not easily done, because it is difficult, if not impossible for competitors to assess unambiguously which causes, such as managerial choice or the exact nature of the specific capabilities employed, are the source of the firm's success. There is, in other words, a high level of 'causal ambiguity' associated with the transfer of organizational capabilities (Lippman and Rumelt 1982). To work around this problem, the competitor might try to develop substituting capabilities. However, this is the same situation as is being discussed: the problem of how the firm develops and makes operational its capabilities.

Having stated that the firm needs resources-among which are capabilities-for the undertaking of its activities, the question follows how the firm's capabilities are put into practice. Capabilities allow the firm to undertake certain activities, but they are

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not the activities themselves. Employees and managers have to make operational their know-how, knowledge, skills, experiences, etc. when working for the firm. Usually this is done by routinization, a response that is appropriate for individuals and organizations who have to cope with complex and uncertain situations under conditions of bounded rationality (Fransman 1994). Organizational routines are the basis of the firm's activities; they allow the smooth and efficient coordination of relatively complex tasks. Routines structure firm behavior in a number of ways: they constitute the firm's memory, they are a disciplining mechanism, they function as standards or targets along which to evaluate employee and firm performance, and they provide heuristics for problem solving and innovation (Nelson and Winter 1982). Firms respond to changes in their external environment by adapting (or not) their routines.

Teece et al. stress the importance of routines for problem solving: "Routines are patterns of interactions that represent successful solutions to particular problems" (Teece et al. 1997: 28). 'Problems' in this respect may have causes within the firm, or they can be caused by changes in the firm's environment. But whereas understanding the firm's routines may be the clue to understanding firm behavior, understanding its routines requires an effort to analyze how routines are based on the underlying capabilities. Therefore, it can be stated that capabilities are the foundations of routines. But, exploitation of the firm's capabilities can only take place through routinization.

Routinization of capabilities has several important advantages. E.g., given a stable environment it allows the firm to specialize, in order to exploit its capabilities more efficiently. It creates continuity within the firm because routines act as the organization's memory, they define the employee's area of competence and discretion, and they are a source of the firm's social structure. But there are drawbacks as well. Routinization can limit the firm's flexibility and its proneness to explore new activities and innovations (Leonard-Barton 1992) and thus enhances organizational inertia (Doz 1994). And because capabilities are routinized, they "stick" to the firm who controls them (Teece et al. 1997). Because capabilities are tacit, knowledge-based resources, they need to be kept in shape, maintained, otherwise they gradually deteriorate, degrade, and loose their value (Dierickx and Cool 1989). And because the firm's competitors learn too, trying to improve performance by ameliorating their capabilities, they threaten the firm's competitive position. Therefore, the firm not only needs to maintain its capabilities, it also has to continuously renew them. Every now and then the firm needs to develop new capabilities and new resources.

Resource specificity has economic relevance because it is a decisive factor in the boundaries of the firm. Williamson's transaction cost economics is based on the question of which resources (or in his term: assets) the firm needs to control directly and which not. This make-or-buy decision defines the boundaries of the firm. Direct control of resources raises the cost of internal organization. However, leaving control of highly firm-specific resources to other companies or to the market increases costs as well, because the firm risks being held up by the other companies' opportunistic behavior. When the latter transaction costs exceed the costs of internal organization, the firm should integrate the activities that are linked to the specific resources. When the firm brings specific resources under direct, hierarchical control, it reduces its total costs (Williamson 1985).

There is a second interpretation of the economic relevance of resource specificity (Langlois 1989). When a firm innovates, it engages in some 'qualitatively new' activities. It creates new opportunities for exploiting its resources by creating new resources or by combining them in new ways (Schumpeter's 1934 definition of innovation). However, efficient exploitation of these new resources also requires that specific complementary resources are put in place. The innovating firm does not necessarily control these complementary resources, but it does need these resources in order to efficiently exploit its innovation. Other firms who control the required complementary resources may resist investing in the new, either because of psychological or cultural reasons, or because of informational reasons. It may be costly to convince these firms of the potential profits that can be realized and to bring them to bearing the risk of investing in the specific complementary resources. In order to find a way out of this trap the innovating firm may decide to bring under direct hierarchical control the required specific complementary resources. On the one hand,

the firm may find it less costly to coordinate such resources. On the other hand, it increases costs by undertaking activities for which it has limited capabilities. This is the case because such activities are likely to be dissimilar, or because the firm is forced to invest in such resources at a larger scale than the scale of operation needed for the innovation, that is, it ends up with excess capacity in specific complementary resources.

The first transactional interpretation of why specific resources are relevant for industrial organization is one of reducing costs; the second is an interpretation of "creating rents that otherwise wouldn't exist (or wouldn't be as great)" (Langlois 1989: 91). In both cases, resource specificity is an incentive to the firm to bring under direct, hierarchical control such specific resources. The two interpretations are complementary as they refer to different situations; respectively late and early stages in the commercialization of an innovation. Both interpretations provide a reason why firms should 'make', 'buy', or cooperage in problem-solving activities. The complementarity of activities can be interpreted as the specificity of the resources that are needed to carry out these activities. Closely complementary activities require more specialized resources.

The competence of a firm is more than what the organization can do. It is the set of things that the organization does particularly well (Andrews 1971). It denotes the firm's ability to develop, nurture, renew, and exploit its resources, notably its capabilities (Prahalad and Hamel 1990; Nelson 1991). Competence is not associated with specific products, rather, it offers opportunities for multi-product activities (Teece et al. 1994). Organizational competence involves (Teece et al. 1994; Carlsson 1992):

- Allocative competence: deciding what to produce, where to market, and how to price
- Transactional competence: deciding whether to make or buy, and whether to do so alone or in partnership
- Functional competence: the ability to operate the various activities within the firm
 efficiently and the ability to learn in this respect

 Administrative competence: how to design organizational structures and policies to enable efficient performance

To manage its capabilities is to say that the firm should efficiently and innovatively exploit, adjust and coordinate its resources. In this respect, the firm critically needs to have access to and control over complementary assets and capabilities (Teece 1986). However, for several reasons, the management of resources and capabilities is complex:

- 1. Some activities can be undertaken by different combinations of resources.
- Capabilities become efficient only when routinized, at the risk however, of becoming inflexible.
- 3. Capabilities need to be developed and sustained by learning through experience.
- 4. Capabilities themselves are complex.

Although the concept of competence is useful for discussing the management of the firm's capabilities, it is less practical to speak of core competence (Prahalad and Hamel 1990). The word 'core' suggests that it is a particular capability that is the source of competitive advantage, such as miniaturization, integration, or communication (Teece 1988). Semantics implies that complementary activities are subordinate to core activities, which they are not, as has been argued above. Complementary activities (and hence complementary capabilities) are related with each other in the value chain. Moreover, 'core' refers to the capabilities of one individual firm, but it is likely that a group of firms have a common competence in managing a set of shared complementary activities. For example, a group of firms in a network configuration can obtain an excellent competitive position by managing the logistics and coordination of interfirm relationships.

Perhaps it would be better to speak of the firm's core business, which "stems from the underlying natural trajectory embedded in the firm's knowledge base" (Teece 1988; 264), or of its core capabilities when referring to those capabilities that, if successfully reproduced by rivals, destroy the firm's competitive advantage. Core capabilities cannot be subcontracted without endangering the firm's competitive advantage. Thus, they are essential for defining the boundaries of the firm.

The firm's competence in managing its capabilities is constrained by three external factors: the size and growth rate of market demand for the firm's products, the degree of appropriability of profits, and technological opportunity in relation to innovation potential.

The possibility to create superior profits, which depend upon the firm's competence in creating, nurturing, developing and exploiting its capabilities and assets, does not imply that the firm in all circumstances will benefit from the profits created. The appropriability regime refers to the conditions under which a firm actually can appropriate the profits from its resources. It is defined as the "environmental factors, excluding firm and market structure, that govern an innovator's ability to capture the profits generated by an innovation" (Teece 1986: 287). The strength of the appropriability regime depends, according to Teece, upon both the "nature of the technology" of the firm's resources (e.g., the 'tacitness' or the 'systems character' of the technology the firm uses), and upon the "effectivity of legal mechanisms of protection", such as patents, copyrights and trade secrets, to prevent others from benefiting from the innovation.

An additional external factor constraining the firm's competence is the state-of-the-art in technology, or more precisely in the firm's perception of the existence of options to innovate (Metcalfe and De Liso 1995). Technology, in this case defined as both the know-how of transforming and processing information, materials, and intermediate goods and as its materialization into equipment and final products, is a major resource to the firm. It refers to both assets and capabilities. Innovation, then, is knowledge based. It can occur within the firm, by learning-from-doing, improving capabilities and routines, and by the R&D function. But it can also stem from technological change taking place outside the firm. In this respect, the general level of advance-or maturity-in a specific technology that is relevant to the firm's activities poses both opportunities and constraints on its competence in integrating the underlying knowhow within the firms knowledge base, its capabilities and routines.

Entrenched organizational routines, specialized knowledge, and dedicated assets exert strong forces on the firm to continue its operations within this industry. Therefore, there is a need for the firm to adapt to the new situation by acquiring new knowledge, developing dedicated capabilities, and transforming these into better adapted or even new organizational routines. Firms should select their competitive arena as a function of the opportunities they see in exploiting their available resources, as a function of their routines and organizational performance, rather than as a function of the attractiveness of the industry structure.

2.6 Question 3: What are the areas of potential change within the organization that can positively impact the use of IS investments?

2.6.1 Organizational Change

Change management is a perennial issue where IS is concerned. Every few years, a new label appears to describe how IS is going to untold benefits to the organizations that deployed: business systems planning, information resource management, BPR, and most recently organizational transformation have been key phrases. The pressures for continual organizational change involving technology are many. One source of pressure is of course the emergence of the world economy and intense competition that started with the Japanese approach to lean production (Womack, Jones, and Roos, 1990), and that continues even today with an emerging "confrontation" style (Cooper, 1995). Another source of pressure is the cost-performance dynamics of IS itself, which expand the uses to which computing can profitably be put (Yates and Benjamin, 1991). Yet another is companies increasing recognition of the benefits of being wired through the Internet. Although the cost per unit of computing will continue to decrease sharply, organizations face ever-increasing expenditures for IS-enabled change projects in all facets of IS internal and external operations as they review and revise them to the competitive pressures.

There is a large amount of research on effective management of change in the general management, human resource, and organizational development literature. However, little of this knowledge has worked its way into IS education and practice. IS research usually implies that specific goals of technical change should be set by others, usually managers, not by the specialists themselves. In Block's useful characterization of the roles at consultants can play (1981), IS specialists act as "pairs of hands" for managers

aside what the technology should accomplish and as technical experts with respect to how these objectives should be realized with IS. This IS view is highly consistent with the ways in which IS work has been structured and managed in organizations. Internal IS groups have traditionally been the sole providers of computing services, and clients have generally had a relatively limited range of options available to them (Friedman, 1989).

This has changed, however, with the increasing acceptance of outside consulting, known as outsourcing. Given the limited technological resources available, outsourcing has become a necessary business practice. IS consultants used in outsourcing have gained respect and acknowledgement as people who understand not only the technology but the business use of it. Therefore, the changes in the IS provisioning has changed the role of IS in the organizational change process.

Sambamurthy and Zmud (1996) have created a new economic and organizational paradigm that defines businesses by the collection of resources they comprise. In this paradigm, resources are broadly interpreted to include sets of skills and competencies as well as tangible assets. This is because IS managers are under increasing pressure to justify the value and contribution of IS expenditures to the productivity, quality, and competitiveness of the organization. IS managers often lack the tools they need to decide if they are accomplishing the right activities (Davis & Hamann, 1988). In addition, these managers often fail to learn if they are meeting the needs of their customers. The productivity of the information systems function has proven difficult to define and measure (Scudder & Kucic, 1991).

The effectiveness of the IS function within the organization has proven practically impossible to define and measure (Niederman et al., 1991). Many possible explanations for this difficulty are available. For example, the role of the IS function in business performance can be subtle and difficult to differentiate from other factors (Crowston & Treacy, 1986; Niederman et al., 1991).

Organizational assessment is essential to supply the feedback needed for the effective management and continuous improvement of the IS function. Managers define what is important to the organization and manifest corporate culture in their assessment choices (Eccles, 1991; Strassman, 1990; Tsui, 1994). "What gets measured gets attention" (Eccles, p. 131). The relationship between IS performance and organizational performance should be more carefully explored (Weill & Olson, 1989). It is clear that IS assessment is vital to the organization. Also, IS executives need a comprehensive framework for assessment tied to organizational performance to aid them in developing IS assessment systems.

The increasing global interdependencies and the accelerating pace of change demand more flexible and adaptive organizations (Malone and Crowston, 1991). Malone and Smith (1984) have defined organizational flexibility in terms of "vulnerability" and "adaptability." Effective implementation of IS would decrease vulnerability by reducing the cost of expected failures and enhance adaptability by reducing the cost of adjustment. Rockart and Short (1989) attribute the ever-increasing need for managing interdependence to competitive pressures that included globalization, time-based competition, increased market risk, and a greater emphasis on customer service and cost reduction. Bennis (1974: 22) notes that "the organization's response to the environment will continue to be the crucial determinant for its effectiveness." Since post-industrial organizations will be faced with increasing environmental complexity and turbulence, organizations' needs to process information and make decisions will be substantially increased (Huber, 1984). The capabilities and flexibilities of computer-communication systems make them increasingly relevant to organizations by being able to respond to any specific information or communication requirement (Holt, 1992: 40).

2.6.2 Organizational Structure and Best Practices in IS

Benjamin and Levinson (1993) emphasized that for IS-based change to be effective, technology, business processes, and organization need to be adapted to each other. Comparing the present information revolution with the Industrial Revolution, Malone and Rockart (1993) indicated that the latest changes in IS would lead to the evolution of new technology-intensive organizational structures. They project that the advances in IS would result in dramatic decline in the costs of "coordination" which would lead to new, coordination-intensive business structures. Rockart and Short (1989) suggest

that IS would enable the firms to respond to the "new and pressing competitive forces" by providing for "effective management of interdependence." Interorganizational relations, that are based upon trust and conditions of unstructured authority (Litwak and Hylton, 1962) would be created using newer types of coordination mechanisms. Malone and Crowston (1991) believe that in light of these new possibilities there is need to reassess our current theories of organizations, of markets, and of management.

Many researchers have examined the organizational structure of the IS function (Olson and Chervenay, 1980; Ein-Dor and Segev, 1982; King, 1983; Brancheau and Wetherbe, 1987; Dearden, 1987; Tavakolian, 1989; Niederman, et al., 1991; and Brown and Magill, 1994). Except for research on IS structure in multinational companies (Karimi and Konsynski, 1991; Alavi and Young, 1992; Roche, 1992; Gibson, 1994; and Burn and Cheung, 1996), which mainly addresses decisions about whether to locate IS at corporate headquarters or within the geographical units, little work has been done on the relationship of IS and the business units. Overall, research on IS structure and business units so far has focused primarily on two issues: (1) control versus coordination, often recast as the centralization versus decentralization choice, and (2) the nature of the IS architecture, specifically the IS hardware and software infrastructure.

Centralization refers to allocating all IS resources to a single business unit that then provides IS services to the entire firm; decentralization gives individual business units the responsibility for control over local IS resources with little or no consideration of other units (Burn and Cheung, 1996). In the first restructuring of multinational firms, business units were often synonymous with geographical location. The most basic analyzes contrast the control, efficiency, and economy of centralization with the flexibility, empowerment, service-orientation, and efficiency of decentralization in meeting individual needs (Dearden, 1987; Kim, 1988; Moad, 1989; Alter, 1990; Von Simson, 1990; Meyer, 1991; Alter, 1996; and Adhikari, 1996).

Contingency theories look at the fit between IS centralization and the company's multinational strategy and structure (Olson & Chervany, 1980; Leifer, 1988; Egelhoff, 1991; LaPlante, 1991; Alavi and Young, 1992; and Roche, 1992; Jarvenpaa and Ives,

1993). They also examine the alignment between IS centralization and the need for or extent of information sharing in the organization (Egelhoff, 1988; Karimi and Konsynski, 1991; Lee and Leifer, 1992; and Simon, 1996). In firms that use an organization-level structural paradigm, IS services and their management can be both centralized with IS specialists at the corporate level and decentralized with IS specialists in business units (Dearden, 1987; Von Simson, 1990; Boynton, Jacobs, and Zmud, 1992; and Cale, Kanter, and Saia, 1993). McWilliams (1996) offers the shared internal services model as another hybrid way of solving the centralization-decentralization conundrum. This model captures the economies of scale in centralization while keeping the support functions focused on the business units. The hybrid models, combined with centralized and decentralized approaches to IS delivery, suggest that generic types of interaction between corporate IS and business units might exist. In general, however, these models do not delineate the more specific nature of this interaction, showing, for example, how several centralized or several decentralized structures might exist.

Researchers who address the IS architecture as a key element of the structure of service delivery focus on the nature, organization, and location of IS resources, such as computers, communication equipment, data, and people (Targowski, 1990; Sankar, Apte, and Palvia, 1993; Gibson, 1994; Sabherwal and Kirs, 1994). Allen and Boynton (1991) argue that the selection of IS architecture is based on criteria of efficiency and flexibility. Their categorization of architectures as "low road," in which IS technology and its management are dispersed widely throughout the firm, and "high road," in which core IS activities are centralized and the role of senior IS executives expanded, suggest extreme ways of IS interacting with the business units -- either IS has sole responsibility for major activities or business units have such responsibility.

Both external and internal factors affect the design of the IS architecture and potentially influence the structure of the IS function. Simon (1996) hypothesizes that three business factors affect the information architecture: MNC firm structure, strategic predisposition of the firm, and the organizational culture and personnel practices. Boynton, Jacobs, and Zmud (1992) suggest that the design of an appropriate IS management architecture should consider networking resources, shared data, common application systems, and human resources. The variety in these factors, together with the resulting diverse architectures, suggest that numerous structures for the IS function likely result.

Recent restructuring decisions in multinational corporations have refocused attention on the centrality of the business unit (Mazur, 1994; Sweeney, 1995; Westoby, 1996). Research about the structuring of the IS function has also acknowledged the importance of the business unit (Allen and Boynton, 1991; Cale, Kanter, and Saia, 1993). Still, it has not explored the role of the business unit in detail, in large part because the bulk of the research has focused on the significance of the centralizationdecentralization continuum and IS architecture for structuring. Jarvenpaa & Ives (1993) present an alternative to the focus on centralization-decentralization and IS architecture; they hypothesize that an organization's IS function is structured to support its strategy. Using the IS dimensions of locus of decision-making, number of common systems, mode of operations, IS reporting relationship, and developmental approach, they identified four structural prototypes that were highly associated with the overall corporate strategy. But this research stopped at the strategy-structure interface and did not look further to the IS function - business unit interface.

2.6.3 IS, Systems Theory and Change Management

System theorists have recognized the importance of "feedback" for the survival of the system (Miller, 1965) and for maintaining a "steady state" or "homeostasis" (Katz and Kahn, 1978). Organizations are purposive systems that learn of the impending threats by scanning. Scanning is the process by which the organization acquires information for decision making. The modes (surveillance and search) of scanning are primarily determined by the external environmental stimuli and are determined by the magnitude and by the direction of the discrepancy between the goal and its realization (Schoderbek, Schoderbek & Kefalas, 1980). While surveillance is useful for information-gathering process, search is oriented toward finding a satisfactory solution to a specific problem. Complex systems require complex controllers (Ashby, 1956). IS can provide the "complex controller" to the increasingly complex organization. The information systems of an organization need to evolve to remain consistent with the changing organizational structure (Daniel, 1961). Referring to the

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obscurity of causal laws of turbulence, Aldrich (1979: 73) argued that scanning could provide the firm with the desired "competitive edge."

Continuously changing environment requires organizations to continuously reassess their goals (Thompson and McEwen, 1958). Effective structuring requires a consistency among the design parameters and contingency factors (Mintzberg, 1979). Maniha and Perrow (1965) have demonstrated that organizations' goals can be generated by external forces, such as other groups seeking to use the organization to further their own ends.

The very efforts of the organization to maintain a constant external environment produce changes in organizational structure (Katz and Kahn, 1966). Scott (1987) argued that organizational structure and goals are driven by the preferences in the environment. The structure is determined by the information-processing capacity requirements of the organization (Galbraith, 1977: 36) which in turn are governed by the IS being used. Aldrich (1972), Perrow (1967), Walker (1952) and Woodward (1958, 1965) have attributed structural differences to the organization's technology. Mintzberg (1979: 221) had suggested that the organization's environment and technology are the independent (contingency) variables that determine the structural variables of the organization.

Law of requisite variety (Ashby, 1956) implies that the rate of change of organizational systems must correspond to the rate of change of environmental systems, i.e., organizations with complex environmental interactions would develop complex structures (Becker and Neuhauser, 1975: 71) like adhocracies or networks. Adhocracy is suitable for a dynamic and complex environment, when the firm has sophisticated technical systems and the focus is upon consistently offering differentiated products (Mintzberg, 1979) for retaining the customers. Future organizations would be "networks" (Keen, 1991) characterized by adhocracies with flexible systems of projects and teams (Drucker, 1988; Malone and Rockart, 1993; Mintzberg, 1979) brought together quickly to accomplish specific tasks (Ramstrom, 1974; Rockart & Short, 1989; Toffler, 1985). Some existing organizations have already "farmed out" their operations by establishing them as separate organizations or contracting them out to other organizations (Mintzberg, 1979).

Organizations structure themselves to minimize coordination costs (Galbraith, 1970) and group together similar activities to achieve the benefits of process specialization (March and Simon, 1958). Environmental uncertainty or "task predictability" is the basic independent variable influencing the design of the organization (Galbraith, 1970; Perrow, 1967; Thompson, 1967). Faced with increased uncertainty, organizations can reduce the need for information processing by decreasing the "diversity of outputs" (Galbraith, 1973). Reduced differentiation and integration (Lawrence and Lorsch, 1967) of activities would decrease the coordination effort involved thus reducing the information processing requirements. Reduced coordination costs with IS would result in the substitution of IS for human coordination (Malone and Rockart, 1993). Greater specialization could be achieved by focusing on few core competencies.

In general, open systems theory provides a 'holistic' perspective of the organizational issues which involves all the interactions in the environment- organization interaction matrix. This is increasingly significant because most organizational change is externally induced. "Survival of the fittest" is a function of the fitness of the environment (Terreberry, 1968). Organizational adaptability is a function of the ability to learn and to perform according to changes in the environment. Complexity and rapidity of change in "external connectedness" results in increasingly unpredictable change in the organization's transactional dependencies. Adaptability exists to the extent that a system can survive externally induced change in its transactional interdependencies in the long-run. To confront increasing environmental turbulence, organizations are seeking to increase their transactional interdependencies.

In terms of empirical research on organizations, the open systems theory has had negligible impact. Though the open systems model has been widely used to label and legitimize organizational studies, it has seen little use as a research guide. The organizational researchers have not been able to exploit the potential contributions of this theory in empirical research (Ashmos & Huber, 1987: 610). Few researchers have the tools or the ability to take into account all the various components that must be included in even a relatively simple open systems model(Hall, 1977:59).

To appraise the effectiveness of an organization with the aid of systems theory one must measure its performance with respect to the four systemic processes - inputs. transformations, outputs and feedback effects - as well as their interrelationships. Measurement of the various forms of organizational inputs and outputs is pretty much undeveloped. Moreover, unlike the preoccupation with achieving equilibrium condition, the organizational system is seeking to maximize or minimize one or more values, whether they be profit, cost, influence (Evan, 1993). The more commonly accepted approach for organizational research is the goal approach which considers goal achievement or the degree to which an organization attains its goals. As an exception, Evan (1993) has demonstrated the operationalization of the four systemic processes in a study of interorganizational relations among hospitals using the systems theory approach. He suggests the possibility of developing organizational effectiveness measures without directly and explicitly identifying their goals but indirectly by measuring dimensions of inputs, transformations, and outputs of an organization. The problems encountered in defining an organization's goals can be avoided by indirectly deriving the goals by using Evan's approach.

Unlike the systems theory view of organizational constructs, the most common approach taken by empirical researchers has been in terms of goal achievement or the degree to which an organization attains its goals. This poses a problem of identifying or postulating the goals, manifest and latent, of an organization. Some researchers seek to avoid the goal approach and argue in favor of the "resource" approach. While there is much merit in emphasizing the crucial importance of resources - or in ,systemic terms, of input processes and input goals - it ignores the other three systemic processes. On the other hand, the economist's bias of measuring outputs in relation to inputs overlooks the other systemic processes that eventually effect the organization's overall survival or growth. Clearly, the systems approach has its advantages. Moreover, the problems encountered in defining an organization's goals can be avoided by indirectly deriving the goals - by positing the three generic goals of input, transformation, and output (Evan, 1993).

Overall, open systems theory presents a "holistic" approach to the research of organizational problems, but the researchers need to be more creative with the operationalization of the goals. Further, they would need to conduct a more systematic inquiry of the various properties of open systems enumerated by Miller (1965: 193-237) and Katz and Kahn (1987).

2.6.4 Relationship between Organizational Structure and Productivity

The relationship between the organization's structure and its productivity is partly connected to the approach to cost. Organizations of any kind consist of behavior constraints, which serve to direct individual behavior towards the mutual interest of the relevant group. These constraints, whether prices or management directives, are costly to enforce. Enforcement costs are treated as equivalent to the costs of detecting changes in activities, such as the quality of goods and work effort. Because price constraints are costly to enforce and because different types of constraints will have differing costs of enforcement, the latter provide an economic basis for choice among different forms of organization (McManus, 1975).

Evaluating organizations according to an efficiency criterion, such as productivity, would make it possible to predict the form organizations will take under certain conditions. Organization theory has not developed such a criterion because it has lacked a conceptual scheme capable of describing organizational efficiency in sufficiently microscopic terms. The transactions cost approach provides such a framework because it allows us to identify the conditions which give rise to the costs of mediating exchanges between individuals: goal incongruence and performance ambiguity. Different combinations of these causes distinguish three basic mechanisms of mediation or control: markets, which are efficient when performance ambiguity is low and goal incongruence is high; bureaucracies, which are efficient when both goal incongruence and performance ambiguity are moderately high; and clans, which are efficient when goal incongruence is low and performance ambiguity is high (Ouchi, 1980).

Demsetz (1988) introduces the importance of information costs in transacting and managing production and exchange. He notes that the relevant question "is not whether management cost is more or less than transaction cost, but whether the sum of management and transaction cost incurred through in-house production is more or less than the sum of management and transaction cost incurred through purchase across markets." Internal versus external costs of production are also important to consider. Corporate charters, long-term associations, and the conscious direction of resources identify firm-like organization. Demsetz concludes that "the vertical boundaries of a firm are determined by the economics of conservation of expenditures on knowledge."

According to Williamson (1980), an assessment of alternative modes of organization entails (1) an identification of the relevant transaction cost dimensions for assessing performance, (2) a description of the organizational and operating properties of alternative modes, and (3) a comparative evaluation of alternative modes in terms of their transaction cost attributes. Transaction costs drive organizational outcomes in considerable degree. Sociologists, radical economists, and others who claim that hierarchical modes of organization are explained by power rather than efficiency neglect transaction costs in reaching this conclusion.

2.6.5 IS Outsourcing Decision Making

In looking at transaction cost, and looking at the inherent risks involved in alternative modes of organization, organizations using IS therefore look at how decisions are made for the organization about IS outsourcing. IS outsourcing is using external resources, either freelancers, consultants or IS expert firms, for either particular pieces of work or on an ongoing basis as partners in the organization.

Some argue that outsourcing IS leads to lower costs, economies of scale, access to specialized resources, and new business ventures (Gupta 1992; Huff, 1991). Others, however, warn firms against the negative consequences that IS outsourcing may have: escalating costs, diminishing service levels, loss of expertise, and contract irreversibility, to name a few (Earl, 1996; Gack, 1994; Lacity and Hirschheim 1993).

Outsourcing decisions, and contractual arrangements of the type required by an IS outsourcing deal, do indeed entail risks. This is not to say that outsourcing is bad in itself. It only means that, as in other risky business ventures such as new product development, capital investments, and IS projects, risk assessment and risk management are important contributors to the success of an IS outsourcing venture (Rao et al., 1996).

The notion of risk is pervasive to the business literature in general, and to the IS literature in particular. However, the term often refers to two different concepts. For instance, risk is sometimes used as a general expression that refers to negative outcomes: shortfalls in systems performance, in the case of a software development project (Boehm, 1991), disruption of service to customer, in a business process reengineering (BPR) context (Roberts, 1994), and hidden costs or loss in innovative capacity, in the case of IS outsourcing (Earl, 1996). Other times, the term risk refers to the factors leading to negative outcomes: continuing stream of requirement changes or personnel shortfalls in a systems development context (Boehm, 1991), lack of upper management commitment, in BPR (Rao et al., 1996), and inexperienced staff or business uncertainty when discussing IS outsourcing (Earl, 1996).

In fact, the concept of risk encompasses these two components. Following Boehm (1991), risk is defined here as "the possibility of loss or injury", and on the basis of this definition, risk assessment consists of the steps listed in Figure 2.3. Since all the risk factors do not give rise to all the undesirable outcomes, risk assessment should also link risk factors to undesirable outcomes. For instance, in the case of a software development project, the lack of project team knowledge about the activity to be supported by the application under development is a risk factor which is linked to the negative outcome of having a system that does not adequately respond to user information needs (Davis, 1982). Yet, this undesirable outcome is less likely to be closely linked to the risk factor defined as "shortfalls in externally furnished components" (Boehm, 1991).

Figure 2.3: Risk Assessment Procedure

1. Assess the loss due to undesirable outcomes:
Identify the potential undesirable outcomes for a given project; Evaluate the magnitude of the potential loss due to each negative outcome;

2. Assess the risk probability:

Identify the risk factors that might lead to undesirable outcomes; Identify the links between risk factors and undesirable outcomes; Assess the extent to which each risk factor is present in the project.

Some of the activities of Figure 2.3 are generic to a given type of project or decision, while others have to do with a particular project. In their discussions of IS outsourcing, many authors have identified undesirable consequences that might result from such a venture. Three sources were particularly useful in this exercise since they devote much attention to this dimension of outsourcing arrangements (Aubert et al., 1997; Earl, 1996; Lacity and Hirschheim, 1993). Since IS outsourcing is a typical example of a make-or-buy decision, industrial organization literature was also used as a source for identifying negative consequences of IS outsourcing. Table 2.2 synthesizes this literature review.

Hidden costs	Hidden transition costs and management costs (Cross, 1995; Earl, 1996; Nelson et al. 1996) Hidden service costs (Lacity and Hirschheim, 1993; Lacity et al. 1995)
Contractual difficulties	Costly contractual amendments (Earl, 1996) Disputes and litigation (Aubert et al., 1997; Lacity and Hirschheim, 1993) Difficulties in renegotiating contracts (Lacity and Hirschheim, 1993) Lock-in (O'Leary, 1990)
Service debasement	Diminished quality of service (Aubert et al., 1997) Increased costs of services (Lacity and Hirschheim, 1993)
Loss of organizational competencies	Loss of IS expertise (Dorn, 1989; Earl, 1996; Lacity and Hirschheim, 1993) Loss of innovative capacity (Earl, 1996) Loss of control of the activity (Slaughter and Ang, 1996) Loss of competitive advantage (Dorn, 1989; Earl, 1996)

Table 2.2: Undesirable Conse	quences of IS Outsourcing
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The first group of undesirable consequences pertain to hidden costs, which are sometimes said to be the biggest IS outsourcing problem (Lacity et al., 1995). Transition costs include setup costs, redeployment costs, relocation costs, and parallel-running costs, and so on. Management costs refer to the human resources that have to be put into managing an outsourcing contract. According to Earl (1996), companies often underestimate these two types of costs, which can increase quite rapidly. Cross (1995), for instance, reports the experience of British Petroleum who, after having outsourced its IS operations to several outsourcers, discovered that such contracts "required far more management resources than they were worth (Cross, 1995, p.94).

In a discussion about the cost-benefit aspects of the software acquisition decision, Nelson et al. (1996) identify another type of costs that could be added to the transition and management costs mentioned by Earl. These are contracting costs, that include the costs related to searching and evaluating the appropriate vendor, benchmarking the services offered, specifying the legal terms of contracts, negotiating contracts, and resolving disputes. Lacity and Hirschheim (1993) and Lacity et al. (1995) identify another type of hidden costs, that is, those costs that the client assumed were included in the contract, but which, in fact, were not. They give the example of maintenance on personal computers, sales tax on equipment purchases, rewiring for office moves, etc, which can add up to several hundred of thousands, even millions, of dollars.

Contractual difficulties constitute another category of negative outcomes of outsourcing. Contractual amendments are often necessary, either because the client's needs are changing, or because most contracts are indeed incomplete (Milgrom and Roberts, 1992; Williamson, 1996). As a result, several firms have seen their outsourcers charge them high fees for such new services or changes in the services rendered (Earl, 1996; Lacity and Hirschheim, 1993). Sometimes, requests for changes give rise to disputes, and even litigation. Disputes also occur over the meaning of contractual terms: services to be rendered, service level, personnel expertise, etc. At the time of contract renewal, other difficulties may arise. An unsatisfied client may wish to repatriate the service. Yet, they may encounter several difficulties in attempting to do so. Often, the required assets will have been transferred to the outsourcer, along with the personnel who possessed the expertise to conduct the outsourced activity. Not only can repatriation be very costly (Aubert et al., 1997); in some occasions, it will be impossible (O'Leary, 1990). The client might then consider

the alternative of transferring the service to another outsourcer. Yet, if the number of suppliers is small, this might be an impossible alternative. Hence, the lock-in problem (Klein et al., 1978; Williamson 1985, 1996).

Service quality and service costs are two major issues in IS outsourcing. The literature provides numerous examples of degrading service levels resulting from outsourcing: poor response time, poor turnaround time, late updates of software, applications that do not meet the requirements, and so on. Often, parallel to service degradation, service costs rise. For instance, one of the firms studied by Lacity and Hirschheim indicated that their outsourcing costs were almost three time the costs internal services.

The area of organizational competencies appears to be quite vulnerable in the outsourcing context. Outsourcing deals almost always include IS personnel. The very fact that no, or little, IS expertise remains in the firm is seen as dangerous, since the firm will have lost its ability to use IS efficiently and effectively, and will remain dependent on an external supplier. The ability to align IS with the firm's strategy might also be hampered, thus affecting the firm's ability to maintain competitive advantage, and to use IS in an innovative fashion (Dorn, 1989; Earl, 1996).

According to the risk definition provided earlier, undesirable outcomes are due to risk factors. Table 2.2 presents a list of such factors identified from the literature. In the context of outsourcing, transactions costs theory and agency theory are particularly relevant to the risk factor identification exercise. Table 2.3 outlines the risk factors according to the three key concepts of these two theoretical frameworks (agent, principal, and transaction).

Agent	Opportunism: moral hazard, adverse selection, imperfect commitment Lack of experience and expertise with the activity to be outsourced
	Lack of experience and expertise in managing outsourcing contracts Number of suppliers
Principal	Lack of experience and expertise with the activity to be outsourced

Table 2.3:	Risk	Factors	in IS	Outsourcing

	Lack of experience and expertise in managing outsourcing contracts
Transaction	Asset specificity Uncertainty Measurement problems Frequency Interdependence of activities Proximity of core competencies Technological discontinuity

Agency theory is concerned with the coordination and motivation issues that are inherent in a relationship between a principal (the client) and an agent (the outsourcer). An basic assumption of agency theory is that opportunism is an inherent characteristic of such a relationship. Opportunism is an important risk factor in an outsourcing contract. There are three main manifestations of opportunism: moral hazard, adverse selection, and imperfect commitment. Moral hazard results from the fact that it is impossible for a principal to observe the behavior of the agent, without incurring prohibitive costs. Since the client cannot directly observe the level of effort deployed by its supplier, it cannot easily tell whether a problem is due to negligence on the part of its supplier or to an unforeseeable event. Since the supplier knows the client cannot tell, the supplier can always blame poor performance on circumstances beyond its control. Adverse selection will develop when the principal cannot observe the characteristics of the agent. The client must validate the suppliers' claims, which often is a difficult task. On the other hand, the supplier is often aware of this difficulty. Failure to deal adequately with adverse selection will make it very challenging for the client to choose the appropriate supplier. Sometimes the agent truly believe that they actually have the required characteristics to adequately perform the activity. In some circumstances, the supplier may commit an error of overoptimism in evaluating its true capacity to fulfill its contractual obligations. An excess of confidence will then lead him into a contractual agreement he, and the client, will soon discover he cannot respect. Roll (1986) has suggested that many acquiring firms which accepted to pay huge premiums to a target were led by managers with exaggerated beliefs in their capacity to "turn around" the target. This is the "hubris hypothesis", from the Greek "Hubris", which means "over exuberance".

Synthesis of Literature

Finally, imperfect commitment is the imperfect capacity of both the client and the supplier to commit themselves. For instance, clients and outsourcers may be tempted to renege on their promises and commitments. No contract is immune from such behavior. A supplier will refuse to deliver the services or adapt applications because, for instance, it claims that such adaptations had not been foreseen, or because the language of the outsourcing contract is not clear. Other characteristics of the agent constitute sources of risk. The lack of experience and expertise of the agent with the outsourced activity is one of them (Earl, 1996). It may happen that a supplier, eager to obtain a contract, exaggerates the expertise it possesses with certain activities. Lack of expertise may also occur over time. Since several firms decide to outsource their legacy systems, vendors hire and retain IS personnel who are familiar with older technology. When the client needs support with new technology, the supplier might not have the required skills available. Another risk factor is the lack of experience or expertise of the agent with the management of outsourcing relationships, which could lead to disputes and to escalating costs. Finally, the extent of competition among agents, which is often related to the number of available vendors, is also a risk factor. A small number of vendors may bring about the lock-in problem, since it will be difficult for the client to find alternative sources of services (Nam et al., 1996).

The principal itself is a source of risk factors. In particular, Earl, and Lacity et al. identify the lack of experience or expertise of the principal with the activity to be outsourced as a major risk factor. These authors claim that while firms might be tempted to outsource those activities that they do not do well, or that they do not understand well, going ahead with an outsourcing decision would lead to negative outcomes. The lack of expertise with the outsourced activity may also have a negative impact on the ability of the principal to adequately manage the contract, since they will have difficulty in assessing the quality and the costs of the service rendered. As was the case with the agent, the principal's lack of experience and expertise with the management of outsourcing contracts is another risk factor, since an inexperienced principal is more likely underestimate transition and management costs, for instance and be vulnerable to the agent's opportunistic behavior.

Some characteristics of the transaction, that is, of the activity to be outsourced, are important risk factors. Asset specificity refers to the degree to which an asset can be

re-deployed without sacrificing its productive value if the contract is to be interrupted or prematurely terminated. Because the "next best use" value of a specific asset is much lower, the investor would loose part of its investment if the transaction was not completed. This creates a lock-in situation where the other party (not investing) could extract an advantage from the investor by threatening to withdraw from the transaction (Grossman and Hart, 1986; Williamson, 1985).

For a market to be efficient, parties must be able to predict with enough certainty the activities to be performed in a contract and to measure the value of the elements exchanged. This is often proven false. Transactions are conducted with a certain level of uncertainty and are subject to measurement problems (Alchian and Demsetz, 1972; Barzel, 1982). For example it may be difficult to predict future user needs in a given project. Evaluating the adequacy of a specific system delivered is also a arduous task, since system quality is difficult to assess without extended use (Nelson et al., 1996).

Frequency is another key dimension of a transaction. Organizing a transaction within the firm implies the creation of a governance structure. This generates important and irreversible costs. If a transaction is known to be unique, these costs will likely be too significant to allow for the integration of the activity within the firm. The firm will prefer to bear the cost of the risks associated with investments or uncertainty rather than invest in order to internalize a single transaction (Williamson, 1985).

The degree of interdependence of the activities to be outsourced - or technological indivisibility (Earl, 1996) - has also been identified as a one of the transaction characteristics that constitutes a risk factor. According to Earl, outsourcing interdependent activities may cause serious difficulties. Aubert (1994) illustrates this type of problem with a dispute over poor response time. The supplier in charge of computer operations blamed the telecommunications firm for poor service, while the telecommunications firm blamed the principal for not having the appropriate equipment, and the principal put the blame on the outsourcer responsible for computer operations for not providing good service. In such a situation, the real source of the problem might be very difficult and costly to determine.

Technological discontinuity is closely related to uncertainty, since it refers to one aspect of the "volatility of the environment that cannot be anticipated" (Nam et al., 1996). By technological discontinuity, we mean technological changes and breakthroughs which may make obsolete the technology which is was part of the contract. In the case of a long term contract which specifies a certain type of technology, transferring to the new technology may incur additional, prohibitive costs. On the other hand, if the client does not adopt the new technology, and its competitors do, reduced competitiveness might result.

Finally, proximity to core competencies is also a risk factor, the presence of which may lead to undesirable consequences. Outsourcing an activity that is close to the core competencies of the organization presents risks (Prahalad and Hamel, 1990). Fine and Whitney (1996) detailed the risks of dependency that were associated with that behavior. When handing out these activities to a supplier, the organization risks that the suppliers will either supplant the client in its own domain, or move in directions different from the ones the client might have chosen. Organizations also must keep the learning associated to their core activities in-house. However, this is often not an easy task since the core is not always a stable set. This analysis is linked to the corporate coherence. Organization learning is facilitated when the organization is centered around its essential capabilities. Outsourcing an activity at the core of the organization might impede organizational learning and lower the competitiveness of the organization (Teece et al., 1994).

Hidden transition and management costs are likely to be due to a lack of experience and expertise of the principal with the outsourced activity. If the principal does not have enough knowledge in the activity to provide the agent with a complete description of the tasks to be performed and to clearly specify its needs, it is probable that unexpected costs will be incurred during transition. Both partners will discover the existence of gray areas in the definition of the activity, once again adding to the original cost. In fact, many clients seem to be ignoring the agency costs as defined by Jensen and Meckling (1976). Any principal giving work to an agent will have to incur costs to supervise and monitor the agent. The principal might have a difficult time doing so because the principal will lack information about the agent's activities. Acquiring this information is costly. But all risk factors do not lead to all undesirable outcomes. Risk assessment then requires that the link between a consequence and the risk factor(s) leading to it be drawn. Table 2.4 summarizes those links. It should be noted that only those factors that, from our review of the literature, appear to be the most closely related to a given outcome are indicated in Table 2.4.

Undestrable Consequences	KISK Factors
Unexpected transition and management Costs	 Lack of experience and expertise of the principal with the activity
Lock-in	 Specificity of the transaction Small number of suppliers
Costly contractual amendments	UncertaintyTechnological discontinuity
Disputes and litigation	 Measurement problems Lack of experience and expertise of the principal and/or of the agent with outsourcing contracts
Service debasement	 Interdependence of activities Lack of experience and expertise of the agent with the activity Supplier size Supplier financial stability
Increased costs of services	 Opportunism of the agent Lack of experience and expertise of the principal with contract management
Loss of organizational competencies	 Proximity of the core competencies

Table 2.4: Links Between Undesirable Consequences and Risk Factors

A lock-in situation often results from specific investments that were made by the supplier when the contract was first signed. At contract renewal time, if no other supplier is ready to make specific investments, the client does not have other alternatives but continue its relationship with the current supplier (Klein et al., 1978). The supplier can then increase its fees, because of this lack of alternatives. The lock-in situation may also occur in an industry where there is only a small number of suppliers. Once again, when time comes to renew the contract, the client does not

have many alternatives. The agent can then almost dictate the conditions of the contract (Williamson, 1985).

Costly contractual amendments are related to the level of uncertainty of the outsourced activity. When requirements, quality criteria, service levels and so on are not well defined, the client is likely to ask for adjustments. Contracts have to be reopened and modified. Such modifications are often mandatory for the conduct of the principal's business. Contract modifications often bring about costs. Technological discontinuity is another source of contractual amendments. Since very few contracts make it mandatory for a supplier to respond to unforeseen technological changes, it is likely that the client will have to pay quite a high premium when these changes actually occur (Perry, 1989).

Service debasement may result from several risk factors. Interdependence between an outsourced activity and activities which remained inside the firm is one of them. When an activity is outsourced, it is expected that the fact that it is performed outside the firm's boundaries will not have negative consequences on those activities that remain inside the organization. Once the activity is outsourced though, the firm may realize that there were indeed dependencies between activities, and that the conduct of the firm's business is perturbed. This is linked to the systemic nature of some activities (Langlois and Robertson, 1992). The lack of experience and expertise of the agent with the activity may also be a cause of poor service quality. Also, it may happen that the supplier does not have the necessary resources, either because of its size or financial situation, to devote to the activity, in order to ensure an appropriate level of service.

Increased costs of services may be due to the agent's opportunistic behavior. The agent may me tempted to overcharge for the activities performed in order to obtain a higher profit from the relationship. The agent's opportunistic behavior is still more likely, and its impacts more important, if the principal lacks experience and expertise with the management of outsourcing contracts (Lacity and Hirschheim, 1993).

Learning about an activity and the acquisition of expertise and experience with the conduct of the activity most often come with the conduct of this activity. When the activity is outsourced, the firm is likely to lose some of its expertise. If the activity is not close to the core competencies of the organization, the consequences are not necessarily dramatic. However, if it is close to the firm's core competencies, outsourcing may even reduce the organization's ability to do business (Prahalad and Hamel, 1990).

2.7 Summary

As seen in the discussion of the role of IS in both Belgian and European banking, the level of automation in the financial services sector is a necessary function of keeping up with user demand for products and services. The Belgian banking sector has changed significantly during the past few years. This evolution is due to several factors such as: globalization of capital markets; internationalization of the banking sector; evolution of trading devices such as e-commerce and direct PC trading; introduction of the euro, and, change-over to the year 2000.

Belgian banks were forced to rethink their strategy, especially at the European level, because of these changes. As in other European countries, Belgian banks were involved both in national and in transnational mergers and were the target of takeovers, which were unknown to the Belgian banking sector up to this point.

The Belgian Banking and Finance Commission (BFC) have played a considerable role in monitoring both the financial soundness and the development of the banking sector over the years. But its challenge lies in the very nature of the changing market developments described above. Due to the on-going move to international consolidation and the fierce competition of financial products from non-banking sources (such as insurance products, pension funds or investment funds), the trend in the future will probably lie in an increased coordination between the controlling authorities of the banking, insurance and securities industries, both at national and international level. Important new studies will have to be devoted to the definition and monitoring of the risks created by the various new products. These are constantly being developed not only by the banking sector but also by the other competing financial institutions.

Because of these internal and external market pressures and shareholder financial demands, the use of technology to gain an advantage in the market against new and old players is a subject of much discussion in the banking community in Belgium.

Competitive advantage can be defined in many ways, as previously discussed, but for the financial community the bottom line is what is really measured. Therefore, in order to assess what role IS has in competitive advantage, it is practical to use the same measures that the bank would use themselves.

2.7.1 Role of IS in the Organization

The business environment in which banks and others operate is changing rapidly. With pressures of globalization, deregulated markets, over-branching capacity, just to name a few, the successful financial organization is one that adapts and is flexible to change. IS can be an enabler of change, but can also take on the role of inhibitor to change as well. This research tries to explore the relationship between IS and business, and examines a framework to assess what role changes from an appropriate information infrastructure within the organizational structure has in the overall competitive situation.

Concern with organizational IS infrastructure is not new and recent evidence suggests it is still important. The evidence of the Price Waterhouse survey of IS managers has consistently had 'IS infrastructure' as one of the top ten issues of concern. Managing the infrastructure raises important issues as is evident from this quote, ' in the minds of executives, infrastructure is someone else's concern (Price Waterhouse, 1997) Their survey of IS in the financial services industry (Price Waterhouse 1997) shows that infrastructure is the number five issue. Broadbent and Weill (1997) suggest that IS infrastructure accounts for more than 58% of the total IS budget of large firms. The evidence from the literature is somewhat inconclusive about the issue of IS driving or enabling the business. The issue has been characterized as business pull or Technology push (Tapscott and Caston 1993). By concentrating on such a dichotomy some subtleties are in danger of being lost. Some evidence presented by Grimshaw and Hinton (1992) suggest that technology opportunities may sometimes be taken to the business. However, the hierarchy is the senior managers with a lack the necessary competencies will develop a plan.

The main problem with the conventional approach to IS strategy process is that the speed which with the business can react to changes in the environment is too slow. The traditional paradigm of IS planning has a focus on application lead approach. A recognition of the central role of business vision and the enabling, yet potentially constrained role of IS infrastructure, provides the basis for suggesting that a framework for IS infrastructure, emphasizing its criticality, needs to be incorporated into the IS planning process. Further understanding of the role of IS infrastructure is therefore critical.

Some people may argue that technology changes so rapidly that there is no point in planning for it. Furthermore, it is frequently said that is impossible to protect how financial services technology will change. Yet it is precisely because of the rapidly changing technology that some attempt is made within the business to develop strategic approach to managing the technology infrastructure (Ward and Griffiths 1996) or what some literature refers to as the IS platform.

Looking for technical opportunities must be linked to the ability of the organization to identify and use other opportunities. Competencies provide a gateway to new opportunities (Hamel 1991). These competencies need to be built with an organization, they sometimes have been referred to as collective learning (Prahalad and Hamel 1990). The kind of competencies discussed in the literature have mainly focused on skills, processes and technology (Post 1997). According to Grimshaw and Edwards (1998), there are five elements that are essential to a successful IS infrastructure:

1. Technical element: staying on top of the technical curve

- 2. Skill element: having the skills to exploit opportunities as they arise
- 3. Structural element: relationship of the IS structure to the business
- 4. Cultural element: organizational culture and its level of adaptation
- 5. Process element : by what process the opportunity should be exploited

The various elements of the infrastructure are related and the coordination of these elements to be managed in a closely watched manner. IS infrastructure results from the long term vision element of the business strategy, using perhaps the 'maxim' approach (Broadbent and Weill, 1997) or some form of critical success factor approach (Rockart 1979). It should be noted that both the business and IS use and improve competencies through time and both supply resources to the delivery of the products and services to the end customer. Both are also involved in the change process to move the business forward against the competition.

2.7.2 Change Management and IS

The degree to which IS/IS can and should be involved in process improvement and change management is an area for debate. Morton (1994) suggests that the largest short-term payoffs from process change may come from reengineering processes with IS support. Whilst this short term, financial perspective may help to explain the motivation behind IS related BPR/process change projects, it fails to explore how this relationship may manifest itself. A number of authors suggest that IS can support fundamental changes to the underlying processes and not simply be applied to the old, inefficient processes (Stickland 1996, Hutton 1995). Harrington (1991) and Davenport & Short (1990) promote the idea that process improvement should be combined with process automation. Whilst, Kaplan and Murdock (1991) state that it is important to take an integrated look at both process and information flows simultaneously, focusing on how information is used in the process and how people interact with systems on both a formal and informal basis. Earl's (1994) view on the relationship between process reengineering and IS stresses that systems analysis and BPR have a lot in common and share common methods, and suggests that process thinking is the same as systems thinking. Perhaps for this reason, it is not surprising that the initiative to move towards BPR frequently originates in the IS department (Childe et al, 1994).

Whilst the relationship between process improvement and IS remains difficult to understand, it is clear that the reality is that process change and IS often go hand in hand. The literature has demonstrated that both the technical aspects and analysis methodologies for process change projects, such as BPR, and IS are interwoven. Most organizations engaged in analyzing their process will inevitably have to consider the supporting IS/IS systems. By the same token, an organization developing a new information system will have to bear in mind the ramifications for their business processes.

2.7.3 Organizational Decision Making and Risk

Change and process improvement using IS involve management decision making, which based on certain accepted levels of organizational risk. As discussed in section 2.5.5., an organization must take into account several factors when determining what is an acceptable level of organizational risk when implementing IS within an organizational structure, such as resources and core competencies. Given that the relationship between the organization's structure and its productivity is partly connected to the approach to cost, organizational behavior constraints, as defined by acceptable risk based on choices made by management, will have differing costs of enforcement, and the latter provide an economic basis for choice among different forms of organization (McManus, 1975).

2.8 Conclusion

This chapter provided a background on the external environment faced by retail banks during this period, and an understanding of the organizational infrastructural issues faced by retail banks during this period. It outlined the three research questions, backed with a synthesis of the applicable research literature.

Synthesis of Literature

The next step in the research is define the methodology to be used to study these three research questions, and to discuss the design of the research undertaken.

Chapter 3: Research Methodology and Design

This chapter introduces the design and methodology of the research, initially focusing on organizational research methods. The chapter also discusses productivity economics and open systems theory – both key elements of the research design.

3.1 Open Systems Model in Organization Theory

Organization is the means through which the enterprise secures the performance of its tasks (Miller and Rice, 1970). An organization as a whole is a system of interrelated sub-systems. In its turn, it is also a component of larger systems—an industry, a community, an economy. Open systems theory addresses the relationship between the various organizational elements and provides a means to analyze any imbalance within the organizational environment. The rationale for choosing an open systems model to assess organizational change in this research can be seen in both the quantitative and qualitative elements of the research design. The eight open system organizational elements and their subcomponents are interrelated and influence one another (Harrison, 1994). Qualitatively, the internal dynamics of the bank organization, as well as its external environment, all affect how effectively technology can play its role in the organization. For the quantitative research, the inputs measured are acted upon in the conversion process by business processes. As in traditional production environments, the productivity of the conversion process in the business has an impact on the ultimate output.

Classical theories on organization research initially had drawn heavily on experience of manufacturing industries engaged in large-scale batch production. Woodward's (1965) research demonstrated that organizational models and principles of management derived from this early work were over-determined by the particular type of technology which they started with, and do not necessarily fit the needs of, for example, service industries which are dealing with exchanges of information and such intangibles such as customer loyalty. Given that the proportion of the working population employed in physical production operations is declining, and the working population involved in service and distribution activities is increasing, methods in assessing organizational structure of these types of industries requires further examination. Unlike a conversion system in the traditional manufacturing sense, the resources involved in the conversion process in services can cross the organizational boundary line; there are suppliers, partners, and customers involved in transactions, which therefore require a view on how the relationship between the organization and the environment works to understand the role of the organization in the conversion process. There are additional impacts of industry standards on the conversion process, and the need for a two-way communication flow with the environment, as part of an open system, for the conversion process taking palace.

Unlike the systems theory view of organizational constructs, the most common approach taken by empirical researchers has been in terms of goal achievement or the degree to which an organization attains its goals. This poses a problem of identifying or postulating the goals, manifest and latent, of an organization. Some researchers seek to avoid the goal approach and argue in favor of the "resource" approach. While there is much merit in emphasizing the crucial importance of resources, or in, systemic terms, of input processes and input goals, it ignores the other three systemic processes. On the other hand, the economist's bias of measuring outputs in relation to inputs overlooks the other systemic processes that eventually affect the organization's overall survival or growth. Clearly, the systems approach has its advantages Moreover, the problems encountered in defining an organization's goals can be avoided by indirectly deriving the goals - by positing the three generic goals of input, transformation, and output (Evan, 1993).

Looking at input, transformation, and output, the open systems approach has been chosen because it has been commended for its potential usefulness in "synthesizing and analyzing complexity" (Simon, 1969) in "live" organizations. Comprehension of a system cannot be achieved without a constant study of the forces that impinge upon it (Katz and Kahn, 1978). Leavitt, Pinfield and Webb (1974) also recommended an open- systems approach for studying contemporary organizations which now exist in

a fast-changing and turbulent environment. Ramstrom (1974) propounds increased emphasis on systems thinking to comprehend the increased interdependencies between the system and its environment, and between the various parts of the system.

Classical and neoclassical organization theories have been found wanting because of their emphasis on organizations as fragmented and closed social systems acting independent of external forces (Baker, 1973). Scott (1961) argued that "the only meaningful way to study organization is to study it as a system" and had observed that the distinctive feature of modern organization theory was in its conceptualization of an organization as an open system. Though several empirical studies have been done for analyzing the impacts of IS at an individual level, there is no conclusive evidence if these results would be consistent at the organizational system level. "Whether individual performance implies organizational effectiveness?" still remains a moot issue.

Efforts of the organization in relation to the external environment produce resulting changes in organizational structure (Katz and Kahn, 1978). Scott (1987) argued that organizational structure and goals are driven by the preferences in the environment. The structure is determined by the information-processing capacity requirements of the organization (Galbraith, 1977: 36) which in turn are governed by the IS being used. Aldrich (1972), Perrow (1967), Walker (1962) and Woodward (1958, 1965) have attributed structural differences to the organization's technology. Mintzberg (1979: 221) had suggested that the organization's environment and technology are the independent (contingency) variables that determine the structural variables of the organization.

From a structural point of view, different areas of the organization often believe that what they do is entirely unique to them, when in reality, each business area must respond to the same types of business events, have similar information available to complete those events, and establish business rules to ensure that the organization's goals are met. However, each business area supports a "line of business" that may have its own vocabulary, procedures, and approaches for allocating resources to fulfill their missions, such as retail versus investment banking.

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Given the speed of change of environment in service businesses, particularly with today's Internet economy where a competitor can show up overnight, the processing capacity and how the organization organizes itself around the core capacities (including technology) in the enterprise may have a great deal of influence on organizational structure. In the banking industry, the use of innovative technology in the organization is geared more towards line-of-business (LOB) functionality, with the core competency of back office processing done on legacy systems such as mainframes. Therefore, structural changes in the organization tend to happen first on the front office side of technology, within the LOB, rather than the back office areas. This is also partly due to the more flexible nature of newer technology, requiring less manpower and less environmental controls to move and change.

Production in a bank, as defined by profitability and productivity, focuses on bottom line characteristics, such as return on assets (ROA), return on equity (ROE), net income and number of loans and deposits. In viewing the bank as an open system, one can take into account that different lines of business (LOB) have better/worse years than others in the same bank, therefore the IS impact is across the entire business per year. One role of IS in the banking services business process is to enable payers and beneficiaries to electronically initiate and track their requests. Moreover, it makes possible the integration of the LOB systems with funds transfer and general ledger systems, leading to improvements in the service delivery value chain. This occurs through the automated initiation of trade services related payments. It also enables the appropriate financial controls to be effected on an intra-day basis to manage risks, and creates the link that supports automated accounting and financial performance evaluation across the banking organization.

Although the productivity measures do not find a link between banking industry output and IS investments, it is important to note that while the volume of financial transactions has been increasing at a dramatic rate, employment in the banking sector in Belgium has remained at a relatively constant level, although there has been a slight decrease in both number of institutions and number of branches in Belgium (Table 3.1). Therefore, there must be some benefit provided by the technology to process the greater demands, given no other inputs aiding the effort.

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	1994	1995	1996	1997
Number of institutions	147	143	140	131
Number of branches	19.159	18.304	17.963	17.259
Number of employees (x 1.000)	76.2	76.5	76.9	76.9
Source: OECD				

Table 3.1: Number of Personnel and Bank Branches in Belgium: 1994-1997

As Belgian banks have been going through mergers and acquisitions at this end of this period, IS is of value to the banking industry not only for time savings, cost reductions, and customer services, but for the ability to give individual banks a competitive advantage or the ability to maintain a competitive position. Expanding automated services is one way of attracting depositors and customers. Banker and Kauffman's (1988) study of 508 branch banks found that ATMs were essential to maintaining market share and customer base—not necessarily to reducing costs.

The banking industry illustrates many of the issues involved with establishing useful metrics for analyzing the economic impacts of IS. Not only are there problems with measuring the output of this industry in a meaningful way (productivity estimates require output estimates), but there is the issue of what to measure in the first place. IS clearly provides "value added" in a range of consumer and producer activities that are not captured by productivity analysis, such as convenience, scope of services, access, time savings, transaction volume, and transaction cost reductions. The challenge is to select one or two representative measures of impact and track their performance over time.

The industry may have experienced a long learning curve in terms of adaptation to new information technologies. Insight into how banks reengineered their organizations, management strategies, and work tasks could inform IS strategies in other industries and shorten the lag between the time a technology is introduced and the time it begins to measurably enhance business performance.

One might suspect that the largely negative or insignificant IS impact reported by a large number of studies in the past (Brynjolfsson, 1993) has caused a dilemma for

management today. On one hand, the popular press is replete with stories of successful strategic use of IS. On the other hand, the research results do not seem to bear out the positive contribution of IS. This appears to be consistent with a growing recognition that the prior work in this area did not contend with the difficult measurement problem involved in this area (Kauffman and Weill 1989). In order to try to overcome some of these measurement issues, the research has tried to address the measurement problem by taking at least three steps. First, we have adhered to the rich theory base of microeconomic production research. Second, we carefully defined the measures of output and inputs for the data. Finally, we embarked on a standardized primary data collection to exercise a modicum of control over data integrity.

For this project, the measurement of impact will be both qualitative and quantitative, in line with the interprevist research philosophy, as to assess not only the bottom line contribution of IS, but the potential rationale behind the role of IS in the banking environment in terms of competitive advantage.

3.2 Framework of Open Systems Diagnostic Model

When assessing the impact of technology on organizations, it is inevitable that there is a focus upon criteria of effectiveness and efficiency in work performance. The larger objective, however, is to understand the manner in which technology impacts, for better or worse, upon non-technological consequences and correlates the adequacy of an organization in fulfilling its broader economic and societal roles. Such objectives require new methods for describing and assessing technologies.

Research on organizational technology suggests that the technology construct reflects the multiple aspects of this work flow or process, which can be characterized by the five dimensions mentioned previously: input characteristics and control, conversion processes, and output characteristics and control -- all part of the open systems model. The significance of these five phases of work process for organizational structure and employee behavior depends on the nature of the organization. The conversion process is a function of existing technical knowledge (what the open systems theory calls

technology), the distribution of work and responsibility among individuals, and the social system in which work is performed. Output control functions are determined to a large extent by the predictability of conversion processes and environmental demands for product quality, or in the case of the banking industry, by industry demands for standards to control variance of transaction costs.

To describe the process of converting inputs into outputs, which is the assumed role of technology in organizations, it is necessary to assess multiple levels of activity across multiple phases of the process. Taken as a whole, the five phases of technology in organizations and three levels of analysis (organization, subunit, and individual) form the building blocks of a view of technology that may be used to develop both content and composition theories.

In the framework presented in Figure 3.1, levels of activity are embedded in one another. Individual or job-level technology is subsumed by subunit or department-level technology. Subunit technology is subsumed by organizational technology. In this framework, core and support technologies reflect the variability in functions at the subunit (in banking, the metier, or business unit) level.

Figure 3.1: Organizational Technological Dime

Levels	Input	Input	Conversion	Output	Output
	Characteristics	Control	Process	Characteristics	Control
Organizations					
Metiers					
(Subunits)					
Individuals					

Core work is defined as work that directly adds value, whereas supportive work is defined as the work that enables the potential of the core work to be realized. In a bank, examples of core work could be credit or foreign money exchange, and supportive work could be registration of trades or back office work to support exchange functionality.

Since organizations such as banks have multiple cores, assessment of organizational technology should give attention to differences in subunit characteristics. As organizations would become increasingly differentiated, assessments of modal technology become less representative of the organization's technology. This may be the case in Belgian banking in the near future, as the holding organizations try to include bancassurance as part of the organizational business unit mix. Measures of the distribution of core and support functions in the organization and assessments of the characteristics of its various subunits may provide better assessments of technology at the organizational level that do measures of modal technology.

To illustrate how this information can be gathered from a research perspective, the following Table 3.2 suggests measures for providing insight into the organizational technology usage.

	Illustrative	Measures, Three I	Levels of Abstra	action	
Socio-technical Systems Level	Concrete	First-Order Abstractions	Higher- Order Abstractions	Data Sources	Dominant Conceptual Orientation
Individual	Task time, errors, etc.	Repetitiveness, skill required, proper tools, etc.	Automation, equipment capacity, etc.	Questionnaires Observation Records	Job Design Ergonomics
Subunit / Metier	Output, delay tine, backlog, etc.	Coordination requirements, scheduling, unit interdependence	Feedback, coordination and modernity	Questionnaires Observation Records Interviews	Operations research Industrial engineering
Organization	Output, unit cost, system capacity	Output variety, budgetary requirements	Adaptivity, system types, etc.	Records Interviews	MIS Operations research Operational accounting

Table 3.2: Measures for Assessing Organizational Technology Usage

The design of the research has been undertaken with a focus on the organization, using a methodology that includes the use of financial cost data and records, interviews and organizational artifacts. The organizational level was chosen, as discussed above, because of the differentiation taking place in retail banking with bancassurance and with multiple delivery channels, also involving technology, that are both important aspects of the organizational design.

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The downside to using the organization, rather than the LOB or the individual is firstly that it involves the aggregation across a large number of processes where some applications may be effective while others may not be. Second, it does not allow us to trace the effect of IS on specific processes and tasks, measuring the output and IS input specific to an area. Third, from a practical perspective, the evaluation of IS applications is important because budget and investment decisions are often requested at the application level. But from what was understood in the initial interviews, in Belgium, IS decisions are made at a senior level, and not by the LOB.

In gathering the information for the research, primary research is to be done with senior management of the respective banks, suppliers, trade industry officials, and other key players in the banking sector during this period. Decisions in Belgian banking for both IS and organizational design are made at the board of director level, and this is another reason why the organizational systems level was chosen, since this level of interviewee can discuss the organization easily, but not so the LOB level.

Secondary information gathering, including organizational artifacts and bank financial information of IS investments, were gathered from two different sources. Bank organizational information came mainly from the banks themselves. Bank financial investment in IS is provided in the format of the ABB-BVB (BVB), the Belgian banking federation. Although it is important for me to say (from their perspective) that the BVB only provided the publicly available overall industry data to me, the individual bank data came from the individual banks in standardized BVB format. Therefore, the data has some level of objectivity in its categories, albeit from the BVB, and is not subject to the definitions of the individual banks.

In defining input and output characteristics, again there is a level of standardization within standard bank financial accounting on what constitutes financial outputs such as ROE, ROA and net income. Sum of loans and deposits is also relatively clear. As for the inputs, the cost/expenses of the IS and non-IS resources are defined somewhat clearly by the BVB data input instructions.

Output definitions were chosen for two reasons. The first was directly related on how the banks themselves viewed outputs, specifically in terms of the bottom line. The

second reason was based on microeconomic research foundations, in particular certain previous research using Cobb-Douglas equations to assess productivity in other industries (Morrison and Berndt, 1990; Loveman, 1994; Barua *et al.*, 1991; Lichtenberg, 1995 and Brynjolfsson and Hitt, 1996).

The quantitative research only does not provide the full picture of how the inputs are converted into outputs, and the relation and role of IS into the wider organization. In order to analyze the conversion process, qualitative research into the interactions of the open system, e.g. the individual bank, is also undertaken to add additional value to the assessment of IS productivity.

3.3 Design of Quantitative Research

A few studies have considered the role of technology in the banking industry. Alpar and Kim (1991) examined the cost efficiency of banks overall and found that IS investment was associated with greater cost efficiency although the effects were less evident when financial ratios were used as the outcome measure. Prasad and Harker (1997) examined the relationship between technology investment and performance for 47 retail banks and found positive benefits of investment in IS staff. These studies, however, did not consider how this IS contribution or level of investment varies across firms. Brynjolfsson and Hitt (1995) found that "firm effects" can account for as much as half of the contribution of IS found in earlier studies. Recent results suggest that at least part of these differences can be explained by differences in organizational and strategic factors.

The quantitative portion of the research will examine technology input components and the corresponding output. Studies of productivity in the banking industry differ on the issue of what constitutes the "output" of a bank. The various approaches researchers have chosen to evaluate the output of banks may be classified into three broad categories: the assets approach, the user-cost approach, and the value-added approach (Berger and Humphrey 1991).

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The assets approach considers banks as "financial intermediaries" between depositors (or those who provide money to the bank) and borrowers (or those who receive money from the bank). The assets approach of determining a bank's outputs is exemplified, for example, by Mester (1987), who argues that "output is best measured by the dollar value of earning assets of the firm, with inputs being labor, capital, and deposits."

The user cost approach studies the net contribution of each of the financial products to the bank's revenue. Depending on whether the product adds or detracts from the revenues of the firm, it becomes an output or an input. Hancock (1991), for example, employed the user-cost approach to determine that loans categorically are bank's outputs, whereas deposits present an ambiguous picture: time deposits are inputs, but demand deposits are outputs.

The value-added approach (or the activity approach as it is sometimes called) studies all assets and liabilities as having some output characteristics without grouping them into exclusive input or output categories. Benston, Hanweck and Humphrey (1982) suggest that "output should be measured in terms of what banks do that cause operating expenses to be incurred." This can be thought of in terms of productivity, as the output is a function of the work done and the expenses incurred. A final measure that is often considered representative of a bank's output is the total revenues of a bank. The Compustat database that Brynjolfsson and Hitt (1996) employ in their study of the impact of technology defines revenues to be the output of the few banks it includes. However, econometric studies of the banking industry have been unwilling to use revenues as an output measure. This is illustrated in Berger and Humphrey (1991) who argue that revenues are often both inputs and outputs.

For this research study, outputs will be defined both in terms of productivity and profitability, as to address the later two schools of thought. The opportunity costs within banks are indeed difficulty to measure, specifically at the industry level. Recognizing that issues relating to productivity and profitability pose different questions (Hitt and Brynjolfsson 1996), the contribution of IS toward both productivity and profitability of banking will be analyzed.

3.3.1 Overall Industry Assessment

Much of the work on the business value of IS, (e.g. Barua et al. 1991; Brynjolfsson and Hitt 1996; Lichtenberg 1995; Lovernan 1994)), and the larger literature on R&D and productivity (see e.g. (Griliches 1988; Hall 1993; Mairesse and Hall 1993)) has used the economic theory of production to estimate the effects of production inputs on output. The choice of the form of the production function is constrained by economic theory which requires that conditions such as monotonicity and quasi-concavity be satisfied.

The theory of production states that the inputs a firm (i) uses can be related to output (Q) via a production function (F). For the purpose of this research, it is planned to investigate the effect of certain inputs: Computer Capital (C), Non-computer Capital (K), Computer Labor (S) and Non-computer Labor (L). In addition to inputs, the production function may also vary with differences in the industry (j) in which a firm operates (e.g. banking), and differences in time (t) to account for short-run economic shocks and longer-run disembodied technical change. Thus we can write:

Q = F(C, K, S, L; j,t)

Previous studies in other industries have separated the IS-components of capital and labor expenses from the non-IS components, and used all four parameters as inputs in the Cobb-Douglas function to make relative comparisons about contributions to output, and the resulting marginal products. Thus, according to this methodology, the Cobb-Douglas function becomes (as in Brynjolfsson and Hitt 1996):

 $Q = e^{\beta e} C^{\beta 1} K^{\beta 2} S^{\beta 3} L^{\beta 4}$

where Q = output of the firm C = IS Capital K= Non-IS Capital S = IS Labor Expenses L = Non-IS Labor Expenses and $\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are the associated output elasticities.

However, the Cobb-Douglas form of the production function allows direct calculation of output elasticities and can be considered a first order approximation (in logarithms) to an arbitrary production function. It is also commonly assumed that time (t) and industry (j) only result in multiplicative shifts in overall output, but do not interact with any of the inputs. These assumptions yield the following equation:

 $Q_{jt} = \exp (\Sigma_1 Y_1 T_1 + \Sigma_{j-1} \delta_j J_j) C_{jt}^{\delta 1} K_{jt}^{\delta 2} L_{jt}^{\delta 3}$

Where : $T_1 = 1$ if observation is year t, 0 otherwise; and J₁ = 1 if observation is industry j, 0 otherwise.

3.3.2 Productivity as Output

Following the work of Hitt and Brynjolfsson (1996), the hypotheses for this kind of a productivity-oriented approach are:

H1a: IS investment makes positive contribution to output (i.e., the gross marginal product is positive).

H1b: IS investment makes positive contribution to output after deductions for depreciation and labor expenses (i.e., the net marginal product is positive).

For the productivity analysis, the intention is to first use the sum of Total Loans and Total Deposits for each year as representative of output. Then, the analysis is repeated with Net Income of the bank (Revenues) as the output measure.

3.3.3 Profitability as Output

For productivity, the focus is on IS as an enabler of internal efficiency. Profitability studies attempt to understand whether the deployment of IS provides any competitive

advantage for the firm. Therefore, profitability-oriented studies are concerned with the question of whether IS investments have contributed to firm profits or stock market value.

Porter (1980), for example, posits that in a free entry competitive market, firms cannot gain sustainable competitive advantages from technologies that are available to every firm. It is only when a technology creates significant barriers to entry that it becomes profitable to invest in it. From this point of view, IS, which is freely available to all firms as it is, does not provide any sustainable competitive advantage to the firm and, in such an environment, IS investment becomes more of a "strategic necessity" rather than a provider of competitive advantage (Clemons 1991). Thus, the firm's investment in IS should not be associated with supra normal profits. This leads to the profitability-oriented hypothesis suggested by Brynjolfsson and Hitt (1996):

H2: IS investment makes zero contribution to profits or stock market value of the firm.

For profitability contributions of IS, it is suggested to use two measures that banks commonly use as indicators of profitability: Return on Assets (ROA) and Return on Equity (ROE). As defined in industry, ROA is "net income as a percentage of total assets", while ROE is "net income as a percentage of total shareholders' equity". Both show how effectively the bank has used the assets and equity.

3.3.4 Data Methodologies

To test the above hypotheses, the researcher will employ the Cobb-Douglas production function as discussed earlier, but for estimation purposes, it will be linearized by taking logarithms of equation and adding an error term. Further, following Brynjolfsson and Hitt (1996), the estimation is performed using the equation per year of:

$$Ln (Q_{y1}) = \beta_{y1} + \beta_1 Ln (C_{y1}) + \beta_2 Ln (K_{y1}) + \beta_3 Ln (L_{y1}) + \beta_4 Ln (S_{y1}) + e_{y1}$$

Where y1 is the first year, y2 the second, and so on, depending on the amount of data available from public and private sources. The researcher will test the three hypotheses mentioned using two measures of output for productivity and two for profitability. In terms of the coefficients derived from the estimation equation, the hypotheses now becomes:

H1a: $\beta_1 > 0$; $\beta_3 > 0$ versus the null hypothesis that $\beta_1 = \beta_3 = 0$ i.e. the marginal products of IS capital and IS labor are positive, implying that investment in IS improves productivity.

H1b: β_l *(Output/IS Capital) - Cost of IS Capital > 0; β_3 *(Output/IS Labor) - Cost of IS Labor > 0.

H1b allows us to verify that IS investment is not just positive, but that it pays more than what is spent on it. This is a stronger test than H1a, which only tests for the gross benefits, since this is estimating whether there are any positive net benefits (i.e. benefits after costs from the gross benefits are subtracted) associated with IS.

Finally, the researcher can also test the following hypothesis:

H1c: β_1 - (IS Capital Expenses / Non-IS Capital Expenses)* $\beta_2 > 0$; and β_3 - (IS Labor Expenses / Non-IS Labor Expenses)* $\beta_4 > 0$.

This hypothesis states that the ratio of the marginal product to the investment in IS capital and labor is higher than it is for the corresponding non-IS investments; this is a much stronger hypothesis than H1a. Not only does it imply that there are positive returns to investment in IS capital and labor but also, that the returns are higher than those from non-IS capital and labor.

3.3.5 Multicollinearity

In the estimation of a Cobb-Douglas production function, it is usual to expect relatively high correlation between the independent variables. In this research, there is

the likelihood of high correlation between IS capital and IS labor investments. However, as Kennedy (1985) notes, "The existence of multicollinearity in a data set does not necessarily mean that the coefficient estimates in which the researcher is interested have unacceptably high variances. The classic example of this is estimation of the Cobb-Douglas production function: the inputs capital and labor are highly collinear, but none the less, good estimates are obtained." The t-statistics will be examined and discussed within the research as to this issue.

3.3.6 Sources of Data

Many of the research cases discussed above have had proprietary research databases for their studies, e.g. both the Wharton Financial Institutions Center and Brynjolfsson and Hitt (1995, 1996). It is the intention of this researcher to obtain financial data on both the industry and the firms from public sources wherever possible, e.g. the banking trade association of Belgium (BVB), OECD, Graydon financial information, annual reports, etc. The restricted access to data on banks, due to sensitivity of outgoing information due to the current merger situation in Belgium, could be a limiting factor.

One area not discussed above, for reasons similar to the opportunity cost issue, is cost reduction in terms of transactional costs. How transactions are defined within a bank varies per organization, and the labor content of the transaction also widely varies.

3.3.7 Firm Level Quantitative Analysis

Analysis of the efficiency, in terms of production, of financial institutions has received increasing attention in recent years. Most of the literature on banking efficiency has traditionally assumed on the analysis of scale and scope economies an implicit assumption that all banking firms are efficient. The aim of the second part of the quantitative research is to analyze productivity, efficiency and differences in technology in the Belgian banking environment. This will be done by looking at the best practices, using data on the top seven banks for comparison, which focuses productivity measures on each of the banks relative to the best performers in the

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industry. According to Belgian banking federation data (BVB), the top five banks were over 60 percent of the total bankproduct (revenue) for the industry in 1997.

Due to the type of data on IS investment available, and the purpose of the analysis, DEA would be the preferred method for studying effectiveness, if the number of data sets were such that DEA modeling would be possible. DEA is a linear programming based technique for measuring the relative performance of organizational units where the presence of multiple inputs and outputs makes comparisons difficult. With four inputs and two sets of two outputs, the difficulty of comparing the efficiency of banks becomes apparent. The DEA method defines a non-parametric best practice frontier that can be used as a reference for efficiency measures. This index is the ratio of the Farrell measures for a production unit with a technical efficiency in two points of time which is measured in relation to two different frontiers. The Malmquist index is calculated from the efficiency measures of the DEA model.

Given the limited data available in terms of years and number of banks, DEA likely not be used. Given several attempts with DEA software using the limited data set (1997-1998, seven banks, plus top five combined data) currently held by the researcher, and discussions with others in academia familiar with DEA modeling, it is clear that the total number of data points that will be available from industry will be, at best, at the technical minimum for DEA models (roughly 20-25 data points). Therefore, the probability of a reasonable analysis from the data will be limited, and if, after data extrapolation from industry sources to create more data points is not successful, an alternative method must be addressed.

The alternative method is to run the same regression analysis as done for the overall industry, but combining the data from all individual banks in the top seven banks, with dummy variables for the individual banks, to see the relationships between the respective inputs and outputs. Therefore, the regression equation for the individual bank assessment would be:

 $\begin{aligned} Q_{y1} &= \alpha_1 + \alpha_2 D_1 + \alpha_3 D_2 + \alpha_4 D_3 + \alpha_5 D_4 + \alpha_6 D_5 + \alpha_7 D_6 + \beta_{y1} + \beta_1 (C_{y1}) + \beta_2 (K_{y1}) + \beta_3 (L_{y1}) + \beta_4 (S_{y1}) + e_{y1} \end{aligned}$

Where $\alpha_{1.7}$ are the intercepts for each bank, $D_{1.6}$ are the dummy variables for the individual banks, Q is the output of the firm, and:

C = IS Capital

K= Non-IS Capital

S = IS Labor Expenses

L = Non-IS Labor Expenses

and $\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are the associated output elasticities. (where y1 is the first year of data available, with y2, y3, etc. depending on available data).

3.4 Design of Qualitative Research

It has been argued that one must get "inside the black box" of the bank to consider the role of organizational, strategic and technological factors that may be missed in studies that rely heavily on public financial data (Frei, Harker and Hunter, 1998). For example, Berger and Mester (1997) estimate that as much as 65-90% of the x-inefficiency remains unexplained after controlling for known drivers of performance.

After assessing effectiveness of the use of IS at both the overall and firm level, the organizational assessment will occur on how the banks in question may utilize technology differently in their operational processes. This research will view the respective banking organizations as open systems in the Belgian economic environment, using the diagnosis model put forth by Michael Harrison (1994). Harrison puts special emphasis on understanding power relations and other actual practices and on assessing an organization's ability to adjust to external constraints and take advantage of new developments in its environment. This last emphasis makes this diagnostic approach useful for the purpose of this research.

In this research of the organization as an open system, technology is added as an input to the environment for a purpose, whether it is to improve a process, change a business operation, or add an additional functionality to the information flow of the business (e.g. intranets) that it might not have before. This outcome of this is measured from a quantitative view as a change in the productivity or profitability of the organization's business process.

The open systems approach to organizations provides a general model that can guide the diagnosis of entire organizations and of divisions or departments within organizations (Beer, 1980; Daft, 1992; Katz and Kahn, 1978).

The framework for the diagnosis of the organizations will be created, as per the interpretive research reporting criteria, by contextualization of the situation at the two banks during the 1994-1998 period. The information will be gathered by critical reflections of public artifacts (articles, reports, other secondary sources), primary semi-structured interviews both with participants in the organizations during this period and with industry experts who have knowledge of this period, and from actual documentation from the banks from this period. A relationship between the details uncovered in the research and the best practices in research literature and in organizational theory will be established, and an organizational diagnosis of the framework will occur using the methodology outlined below on organizations as open systems.

3.4.1 Proposed Theory / Model

The proposed model attempts to show the impact of technology on the organizational function, by showing the organization as an open system. Scott (1961) argued that "the only meaningful way to study organization is to study it as a system" and had observed that the distinctive feature of modern organization theory was in its conceptualization of an organization as an open system. The open systems approach provides a general model that can guide the diagnosis of an entire organization, and of divisions or departments of organizations (Beer, 1980; Daft, 1992; Katz & Kahn, 1978; Nadler & Tushman, 1989). This research uses the diagnostic research of Michael Harrison (1994) on diagnosing organizations as part of the assessment protocol for the model.

Figure 3.2: Organization as an Open System



Using a open system perspective, Scott (1992) defines organizations as "systems of independent activities linking shifting coalitions of participants; the systems are embedded in -- dependent on continuing exchanges with and constituted by -- the environments in which they operate". Organizations are not stable and easily defined, but are shaped and are porous to their environments. Environments "shape, support, and infiltrate" organizations. Effective strategic management requires the ability to understand the complexities of the organization as it affects and is affected by environmental forces.

An organization behaves as an open system that takes in information, material and energy from the external environment, transforms these resources into knowledge, processes, and structures that produce goods or services which are then consumed in the environment. The relationship between organizations and environment is thus both circular and critical: organizations depend on the environment for resources and for the justification of their continued existence. Because the environment is growing in complexity and volatility, continuing to be viable requires organizations to learn enough about the current and likely future conditions of the environment, and to use this knowledge to change their own behavior in a timely way (Choo 1991, Choo and Auster 1993).

3.4.2 Components

Open systems contain a number of system elements that help define processes, and these elements will be assessed in the organizational framework, with the main elements in the open systems model being:

Table 3.3: Elements of Open Systems Theor	ory
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Main Element	Definition of Key Subcomponents
Inputs (or resources)	Raw materials, money, people, equipment, information, knowledge, and legal authorizations that an organization obtains from its environment and that contribute to the creation of its outputs.
Outputs	Products, services, and ideas that are the outcomes of organizational action. An organization transfers its main outputs back to the environment and uses others internally.
Technology	Tools, machines and techniques for transforming resources into outputs. Techniques can be mental (e.g. exercising expert judgement), social, physical, mechanical or electronic.
Environment	The task environment includes all the external organizations and conditions that are directly related to an organization's main operations and its technologies. They include funding sources, suppliers, distributors, unions, clients, regulators, competitors, collaborative partners, markets for products and services, and the state of knowledge concerning the organization's technologies. The general environment includes institutions and conditions having infrequent or long-term impact on the organization and its task environment, including the economy, the legal system, the state of scientific and technical knowledge, social institutions, population distribution and composition, the political system, and the local or national cultures within which the organization operates.
Goals and strategies	Future states sought by the organization's dominant decision makers. Goals are desired end states, while objectives are specific targets and indicators of goal attainment. Strategies are overall routes to goals, including ways of dealing with the environment. Plans specify courses of action towards an end. Goals and strategies are the outcomes of conflict and negotiation among powerful parties within and outside the organization. Goals and other desired future states can be explicitly stated by decision makers or may be inferred by their actions.
Behavior and processes	Prevailing patterns of behavior, interactions and relations between groups and individuals including cooperation, conflict, coordination, communication, controlling and rewarding behavior, influence and power relations, supervision, leadership, decision making, problem solving, goal setting, information gathering, self-criticism, evaluation and group learning.
Culture	Shared norms, values, beliefs and assumptions, and the behavior and artifacts that express these orientations - including symbols, rituals, stories and language. Culture includes norms and understandings about the nature and identity of the organization, the way work is done, the value and possibility of changing or innovating, relations between lower and higher ranking members, and the nature of the environment.
Structure	Enduring relations between individuals, groups and larger units - including role assignments (job descriptions, functions, authority, responsibility); grouping of positions in divisions, departments and other units; standard operating procedures; established mechanisms for handling key processes such as coordination, human resources mechanisms and actual patterns (e.g. cliques, power distribution) that
may differ from the official mandated ones.

In using this organizational framework, a descriptive accounting of the situation during the time period assessed will be used to ascertain what elements are supporting and shaping the use of technology in the organization. The case studies will be ranked in a comparison framework between their situation and 'best practices' in industry, taken from previous literature.

Organizational information on the two banks in the case study research will be gathered through interpretivist research, consisting of contextual analysis of semistructured interviews, documents and other written information provided by the banks, and public secondary sources on the banks and their environment during this period of 1994-1998.

Open system models have several important features for organizational assessment:

- External conditions influence the flow of resources (inputs) to organizations, affecting the reception of outputs, and can directly affect internal operations.
- Organizations use many of their products, services, and ideas as inputs to organizational maintenance or growth.
- Organizations are influenced by their members as well as their environments.
- The system elements and their subcomponents are interrelated and influence each other.
- Organizations are constantly changing, with reactive change occurring in response to internal or external problems, while anticipatory change aims at improving environmental standing or internal operations before problems arise. Incremental changes do not alter the main features of the system components, whereas strategic changes entail basic changes in one or more critical system components and their relation among the other components (Harrison & Phillips, 1991).

- An organization's success depends on its ability to adapt to its environment, or to find a favorable environment in which to operate, as well as to tie people into their roles in the organization, conduct its transformantive processes, and manage its operations (Katz & Kahn; 1978). These system needs do not necessarily correspond to the interests or priorities of top management.
- Any level or unit within an organization can be viewed as a system.

A systems approach to organizations begins with the postulate that they are open systems which, of necessity, engage in various modes of exchange with their environment (Katz and Kahn, 1978). The open systems approach to complex organizations emphasizes the consideration of the relationship between a system and its environment as well as what goes on within the system (Hall, 1977). Baker (1973) notes that organizations are changed in the course of interacting with and adjusting to their environment and also change that environment. Since environmental dependency inhibits the organization's ability to function autonomously, it must manage such dependency to survive as an independent entity (Kotter, 1979). Organizations typically manage environmental dependency by establishing and maintaining resource exchanges with other organizations (Levine and White, 1961).

In this research, the unit of analysis is the organization. Three possible levels of analysis are commonly used in research on organizations and technology; the organization, subunit and individual. The majority of studies reviewed by the researcher in the literature review that dealt with technology and organizational structure involved the assessment of technology (see Table 3.4) at the organizational level. The level at which technological characteristics are measured has important implications for its conceptualization. When technology is assessed at the organizational level through interviews or questionnaires completed by higher level management, or though observation and expert classification, the focus is on the modal or most typical processes used to perform work. Most studies using organizational-level assessment of technology are investigations of relationship of technological variables to dimensions of organizational structure. When modal measures of technology are used, relations between technology and structure may vary as a function of size. Although Aldrich (1972) had called the findings of Hickson et al (1969) into question, technological variables have be found in later research by Child and Mansfield (1972) and others to be more highly related to structure in smaller organizations than in larger ones. These findings may be due to the amount of heterogeneity in types of technology found in any given organization. A larger organization is more likely to employ more types of technology due to more diverse skills and various different processes per business group than a smaller organization with a lesser number of processes.

Implicit in the concept of modal technology is an assumption that one technology is predominant in the organization. In the case of the banking industry, that is usually a valid assumption, given the process structure is designed around a main computing unit, i.e. batch computing on a mainframe. Although most researchers have acknowledged that organizations may have numerous technologies or means to perform work, research is seldom done to assess the amount of variation in the technologies used in the organization.

	Technolo	ogy			
Author	Theorist	Level of measureme nt	Method of measurement	Setting	Findings
Woodward	Woodward	Organization	Records and interviews with manager	Manufacturing firms (N=100)	Technology is related to structure, particularly in effective organizations
Hage and Aiken	Реттом	Individual	Structured interviews of professional staff, scores aggregated at the organizational level	Social welfare and health agencies (N=16)	Routine work is positively related to centralization and formalization; it is negatively related to professional training
Hickson, Pugh, and Pheysey	Woodward , Ashton Group	Organization	Interviews with chief executives and department heads	Manufacturing firms (N=31) and service organizations (N=15)	Technological variables are related to structural variables impinged on by workflow
Zwerman	Woodward	Organization al	Interviews with managers	Manufacturing firms (N=55)	Technology is related to structure, particularly in effective organizations
Rousseau	Thompson	Subunit	Experts classified units	Production units in 13 manufacturing and service firms (N=19)	Intensive and mediating technologics are higher on job satisfaction and motivation and have higher job autonomy and variety than long- linked ones
Morrisey and Gillespie	Thompson	Organization	Authors classified firms	Manufacturing firms (N=2) and service organizations (N=16)	Relationship of professionali-sm to bureaucracy varies according to technology
Peterson	Woodward	Organization	Key officials in each firm indicated appropriate category on questionnaire	1023 employees in Norwegian firms (N=15)	Climate dimensions such as intrinsic and extrinsic motivation are higher in small batch and process firms than in mass production firms
Reimann	Mixed	Organization	Interviews with executives, observation, and consulting documents	Manufacturing firms (N=19)	Technological variables are less highly related to structural variables than are size and dependence

Table 3.4: Brief Summary of Research Literature on Organizational Table 3.4: Table 3.4:

The relationship between organizational structure and the use of IS has been studied from several angles. Scott (1992) argued that organizational structure and goals are driven by the references in the environment. The structure is determined by the information- processing capacity requirements of the organization (Galbraith, 1977: 36) which in turn are governed by the IS being used. Aldrich (1972), Perrow (1967), Walker (1952) and Woodward (1958, 1965) have attributed structural differences to the organization's technology. These research papers will be utilized in the diagnostic framework.

3.4.3 Relationship and interaction Between Components

To appraise the effectiveness of an organization with the aid of systems theory one must measure its performance with respect to the four systemic processes - inputs, transformations, outputs and feedback effects - as well as their interrelationships. Measurement of the various forms of organizational inputs and outputs is pretty much undeveloped. Moreover, unlike the preoccupation with achieving equilibrium condition, the organizational system is seeking to maximize or minimize one or more values, whether they be profit, cost, influence (Evan, 1993). The more commonly accepted approach for organizational research is the goal approach which considers goal achievement or the degree to which an organization attains its goals. As an exception, Evan (1993) has demonstrated the operationalization of the four systemic processes in a study of interorganizational relations among hospitals using the systems theory approach. He suggests the possibility of developing organizational effectiveness measures without directly and explicitly identifying their goals but indirectly by measuring dimensions of inputs, transformations, and outputs of an organization. The problems encountered in defining an organization's goals can be avoided by indirectly deriving the goals by using Evan's approach. In sum, open systems theory presents a "holistic" approach to the research of organizational problems, but the researchers have to be more creative with the operationalization of the goals. Further, they would need to conduct a more systematic inquiry of the various properties of open systems enumerated by Miller (1965: 193-237) and Katz and Kahn (1978).

3.4.4 Implementation and Information Sources

The research will be attempting to gauge the impact of the IS investments by measuring the inputs, transformations, outputs and feedback effects - as well as their interrelationships. This information will be put into context with information on the environment in and around the open system of the bank organization. The combination of the quantitative analysis of the bank data, together with the qualitative diagnostic analysis of the throughput of the transaction in the organization, will provide an thorough picture of the organization's interaction with its technology.

Measurement of organizational inputs and outputs is underdeveloped from a research perspective, particularly from a quantitative perspective. Therefore, the research will use the work of Michael Harrison (1994), who wrote an excellent guide based on open systems theory for diagnosing organizations. Harrison puts special emphasis on assessing an organization's ability to adjust to external constraints and take advantage of new developments in its environment, aiding with the control and transformation aspects of the research.

Input characteristics and input control aspects will be assessed from a framework of open systems elements, such as information on the resource state, the organizational size and complexity, environmental conditions, organizational culture, and others.

The conversion process happens from existing technical knowledge, distribution of work and responsibility among individuals, and the social system(s) in which work is performed, particularly interesting from a cultural perspective. Technology, although an internal element, links the organization to its environment: the environment not only is the source of inputs and the recipient of outputs, but also is the major source of work techniques and tools employed (Scott, 1992). Most banks, like other organizations, do not themselves invent their technologies but import them from the environment. In the case of banks, the technologies and work practices have to lead to standard outputs, outputs in a form that also has to accepted by the recipients of the transaction, whether it be other banks, merchants or consumers.

Along with the view of inputs, outputs and transformation processes, Hickson, Pugh and Pheysey (1969) note that approaches to technology vary by whether researchers emphasize either the nature of the material on which work is performed, the characteristics of the operations or techniques used to perform the work, or the state of knowledge that underlies the transformation process. Combining these two sets of distinctions, it allows the researcher a method of classifying and assessing organizational technologies, as shown in Table 3.5.

Research Methodology and Design

Facets of	Stage of Processing					
Technology	Inputs	Throughputs	Outputs			
Materials	Uniformity of inputs (Litwak, 1961) Hardness of materials (Rushing, 1968) Variability of stimuli (Perrow, 1970)	Number of exceptions (Perrow, 1970) Interchangeability of components (Rackham and Woodward, 1970)	Major project changes (Harvery, 1968) Homogenizing versus individualizing settings (Wheeler, 1966) Multiplicity of output (Pugh et al., 1969) Customization of outputs (Pugh et al., 1969)			
Operations	Preprocessing, coding, smoothing of inputs (Thompson, 1967)	Complexity of technical processes (Udy, 1959; Woodward, 1965) Workflow integration (Pugh et al., 1969) Routineness of work (Hage and Aiken, 1969) Automaticity of machinery (Amber and Amber, 1962) Interdependence of work units (Thompson, 1967)	Control of outputs through stockpiling, rationing (Thompson, 1967)			
Knowledge	Predictability (Dombush and Scott, 1975) Anticipation of fluctuation in supplies (Thompson, 1967)	Knowledge of cause- effect relations (Thompson, 1967) Analyzability of search processes (Perrow, 1970) Information required to perform task compared to information possessed (Galbraith, 1973)	Time span of definitive feedback (Lawerence and Lorsch, 1967) Anticipation of fluctuation in demand (Thompson, 1967)			

Table 3.5: Classification of Technology Measures

(Source: Adapted from Scott, 1975, p.5-6)

In assessing the organizational technology, as the table above suggests, there are many variables that can be examined, depending on the organization, for assessment. By viewing the table above, it can be seen that there are more measures suggested for classification of the characteristics of the throughput operations, and measures emphasizing knowledge also are readily available. For this research, this information is gathered from organizational artifacts and from primary interviews with IS and non-IS management, and will be classified based on the above schema.

Output control functions are determined to a large extent by the predictability of conversion processes and environmental demands for product quality, or in the case of the banking industry, by industry demands for standards to control variance of transaction costs. This information comes from interviews and industry documentation.

To describe the process of converting inputs into outputs, which is the assumed role of technology in organizations, it is necessary to assess multiple levels of activity across multiple phases of the process. By looking at a macro view of the whole retail organization and its interactions with other areas of the bank and of the environment, this can be accomplished. Since banks' focus on operationalization of the goals of the business units is combined at a focus on the bottom line for a macro view of how the bank is doing, the focus on bottom line financial statistics as an output characterization aggregates the respective operational aspects into an overall view.

3.4.5 Potential Difficulties in Methodology

In reviewing empirical studies relating technology and structure, the results tend to be mixed. There are some inherent difficulties in relating technology and structure, due to both the variety of measures employed for assessment and a lack of consensus on what variables to measure or how to operationalize those selected. Another source of difficulty relates to differences in the types of data gathered and in the level at which information is collected (Scott, 1987). The data employed may be obtained from a number of sources, including documents and records, informant reports, or from individual responses to surveys. Difficulties in reliability and validity can be associated with each of these data sources, and in the case of collective measures based on the aggregated response of individual participants, it can be difficult to assign weights for each response.

Several theory issues exist that create disagreement in researchers in terms of the cumulation of consistent empirical findings. These include inconsistencies in the organizational levels at which the findings relating technology to structure are formulated and tested; definition of the concept of technology, which has changed in the last few decades; and differences in assumptions, as a function of the definition of technology, that underlie the research in this area. However, given the great diversity and complexity of types of work and structures covered by many organizations, it is not surprising to find these disagreements nor to understand their dilemma. When the subject of the study is complex and variable, findings will be susceptible to these

complexities and variabilities. Because of these issues, researchers must be made to be aware of the sensitivities of the organizational systems research. Rather than treating the organization structure as a kind of average of its characteristics, it is more appropriate to treat it as an overarching framework of relations linking subunits of considerable diversity, and to develop measures that capture the distinctive characteristics of the overall suprastructure, in this case utilizing the open systems theory to assess the framework.

3.4.6 Potential Limitations of Open Systems Approach

In terms of empirical research on organizations, the open systems theory has had negligible impact. Though the open systems model has been widely used to label and legitimize organizational studies, it has seen little use as a research guide. The organizational researchers have not been able to exploit the potential contributions of this theory in empirical research (Ashmos & Huber, 1987; 610). Most importantly, few researchers have the tools or the ability to take into account all the various components that must be included in even a relatively simple open systems model (Hall, 1977:59).

Therefore, the expectations of gathering <u>all</u> the required information, especially from a historical period, is not that high. However, given the interaction of the retail bank with its environment and with other banking components, and given the additional literature, sited in the beginning of this chapter that focuses on systems theory and productivity, the researcher believes that the open systems method was the best perspective to view the activities of the bank from a production function approach.

In today's changing environment, a bank's success depends on its ability to adapt to its environment, or to find a favorable environment in which to operate, as well as to tie people into their roles in the organization, conduct its transformantive processes, and manage its operations (Katz & Kahn; 1978). These system needs do not necessarily correspond to the interests or priorities of top management. Using open systems theory may not equate with the realities of comparing top management priorities to the actuality of what has occurred historically to assess profitability and productivity.

However, using open systems theory does allow the researcher to better describe the interactions, and perhaps the basis for any successes or failures of these management goals, with more clarity.

3.5 Conclusion

This chapter has discussed the methods used for both the quantitative and qualitative aspects of the research. In understanding why using open systems theory does allow the researcher to better describe the interactions in this environment, the next chapter will describe the external industry and regulatory environments faced by Belgian retail banks during this period.

Chapter 4: Industry Analysis

This chapter of the research outlines both the European and Belgian banking environment during this period, and discusses the regulatory structure underpinning the competitive situation. Then this chapter looks at the industry figures and the results of the quantitative analysis, both for the overall industry and for the top individual banks, leading to the choice of the two banks for the qualitative case studies.

4.1 Introduction

The banking industry illustrates many of the issues involved with establishing useful metrics for analyzing the economic impacts of IS (NSF, 1998). Not only are there problems with measuring the output of this industry in a meaningful way (productivity estimates require output estimates), but there is the issue of what to measure in the first place. The measurement problems are substantial and are discussed in detail in various research literature (Bryjolfsson 1993, Baily and Chakrabarti 1988, Griliches 1997, NRC 1994a, and Oliner and Sichel 1994). IS clearly provides "value added" in a range of consumer and producer activities that are not captured by productivity analysis, such as convenience, scope of services, access, time savings, transaction volume, and transaction cost reductions. The challenge is to select one or two representative measures of impact and track their performance over time.

The first definition for an econometric view is: what constitutes IS? Is it consisting of capital investments only, or does it include labor, which, not altogether incidentally, represents the bulk of IS operating costs? Do IS capital investments include more than computers, and if so, what? The choices of what to count as an IS equipment expense include computing hardware and software, communications equipment, and a variety of office machines (such as photocopiers and some other instruments). At present, there is little consistency among studies, and sources of IS investment data vary from

aggregate government data to private survey-based firm data. One fundamental measurement issue is simply standardizing the definition of IS itself (labor, capital, and types of capital): standardized definitions can facilitate data collection, comparability across data sets, and cumulation of findings.

The banking industry may have experienced a long learning curve in terms of adaptation to new information technologies, as seen by the various pieces of research in the U.S. by the Wharton School at the University of Pennsylvania, as well as other academic and Federal Reserve research facilities. Insight into how banks reengineered their organizations, management strategies, and work tasks could inform IS strategies in other industries and shorten the lag between the time a technology is introduced and the time it begins to measurably enhance business performance.

Most output and productivity studies use what is known as a "production function" model. The resulting statistics are typically least-squares correlations and estimates based on a log-linear regression. Growth accounting, a technique developed by Denison (1985), principally uses an arithmetic/algebraic procedure on national income accounts data. Robert Solow received the Nobel Prize in economics for his estimates of the contribution of technical change to aggregate productivity using a production function model (Solow 1957).

Sichel (1997) asserts that there is no additional contribution of IS hidden in the multifactor productivity (MFP) estimate. MFP is a residual element that reflects technical and organizational changes that improve the efficiency of converting inputs into outputs, hence IS could contribute to gains that are captured by MFP. However, given the nature of growth accounting techniques, IS inputs would have to have a "supernormal" rate of return, and Sichel argues that there is no compelling evidence for such an assumption.

Specifically, IS investment impacts in the 1990s cannot be isolated from the effects of many market, industry, and economic factors such as the deregulation of banking, telecommunications, and increasing retail delivery channels.

4.2 Industry History

4.2.1 EU Retail Banking Industry

Traditionally retail banking services have been provided to customers in the country, even in the region, where the bank is, or was originally, headquartered. These services have typically been offered to individuals, thereafter to small and medium scale business, then to larger corporate clients, and include payments services, consumer credit, credit cards, mortgage products, foreign exchange, and travelers checks, as well as commercial loans and letters of credit.

In contrast, wholesale banking services already are provided to large corporations and financial institutions in more "competitive" regional or global financial markets.

The road to a single European retail banking market in 1993 was paved with ten key banking directives. The First Banking Directive was issued in 1977, for implementation in 1979, but it led to little cross-border movement by banks. It essentially set the criteria for expansion across national boundaries within the EC by incorporating the concept of "host country rule." Under host country rule, a foreign bank or branch was required to gain permission from the supervisory authorities in the host country before it was allowed to operate in the host nation.

As the impetus for integration grew over the years, the Second Banking Directive came out in 1988. It was adopted in 1989 for implementation on January 1, 1993. It replaced the host country rule with a home country rule, and it also adopted some other major principles designed to create unified banking regulations and a more efficient banking sector. Under home country rule, the host country regulators must turn over the primary regulatory responsibility for foreign-chartered banking institutions operating within its borders to the institutions' home country regulators. This reform means that, for example, a Dutch-chartered bank or banking subsidiary operating in Belgium is regulated by its "home" or Dutch regulatory authorities, rather than by the "host" or Belgian regulators. Moreover, the list of authorized banking activities is determined by the bank's Dutch or "home" country standards, not by the "host" Belgian standards.

Another principle underlying the Second Banking Directive was harmonization. The Directive created uniform safety and soundness standards and a comparable competitive environment across the EC member countries. This means that banks operating in more than one EC country face a set of uniform EC standards and capital requirements, rather than a dozen different regulatory systems and capital standards. When the national standards applicable to payment orders (including standing instructions) at the retail level are harmonized in the various "in" countries, this trend is likely to accelerate dramatically: it will be no more necessary for a Brussels resident having a holiday home in France to have an account (in French franc) with a French bank to pay the utilities' bills (gas, electricity, telephone) of his French holiday home than it is nowadays necessary for a Brussels resident owning a holiday home on the Belgian seaside to have a bank account in Belgian franc with a local bank at the Belgian seaside to pay the utilities bills (in Belgian franc) of his Belgian holiday home.

A third principle was mutual recognition. This is the principle of a single banking "license" or "passport," which eliminates the need for EC banks to obtain a local banking charter from the host country for branches and/or bank products that are permitted by their home country bank regulations. Essentially this allows inter-nation banking and branching in the EC.

4.2.2 Belgian Banking

The Belgian banking system in its present form was established in 1935 in order to reestablish financial credibility and confidence in the national economy after the great depression of the early thirties and a number of bank failures as a result thereof. The principal legislative document was the Royal Decree No. 185 of July 9, 1935, which was since amended several times. Royal Decree 185 of 1935 defines a bank as a Belgian or foreign enterprise which regularly receives deposits repayable at sight or at a time limit not exceeding two years, with a view to using them for their own account in banking, credit or investment operations. Banks must be incorporated in the form of

a commercial company and must register with the Banking and Financial Commission (BFC). All private banks fall under the supervision of the Banking and Financial Commission.

However, the Belgian banking environment has materially changed during the past several years. This evolution is due to several factors, including:

- globalization of capital markets;
- internationalization of the banking sector;
- evolution of trading devices such as e-commerce and direct PC trading;
- the introduction of the euro; and
- the change-over to the year 2000.

The ECB observes that the degree of concentration varies quite significantly across EU countries, with large countries tending to have less concentrated banking systems than the small ones. The Belgian market is classified as one of medium concentration, as shown in Table 4.1, along with those of Austria, Ireland, Spain and France.

Country	1996	% of Total
Austria	120.9	1.2%
Belgium ²	676.8	6.4%
Denmark ³	156.7	1.5%
France ⁴	1,298.3	12.4%
Germany ⁵	1,023.3	9.7%
Ireland	108.3	1.0%
Italy ⁶	1,304.2	12.4%
Netherlands ⁷	787.6	7.5%
Spain	517,1	4.9%
Sweden	208.9	2.0%
U.K. ⁸	2,497.3	23.8%
Europe ⁹	10,504.6	

Table 4.1: European Commercial Banks: Total Assets (in ECU Billions)

Source: Banking Federation of the European Union/Banking Business: Abstract of Statistics, Vol.16, 1999, British Bankers' Association.

Separate figures for commercial banks not available.
 Banking sector as a whole.
 Banks with a working capital above DKK100m, excluding Faroese banks and branches of foreign banks.
 Domestic Operations only.
 Private commercial banks excluding mortgage banks and home loan and savings associations.
 Commercial banks and savings banks, excluding rural and artisanal banks and central institutions.
 Consolidated figures, including foreign operations.
 Banking sector as a whole.
 Also includes Finland, Greece, Iceland, Luxembourg, Norway, Portugal, Switzerland.

During this period, Belgian banks were forced to rethink their strategy, especially at the European level, because of the changes outline above. As in other European countries, Belgian banks were involved both in national and in transnational mergers and were the target of takeovers, which were unknown to the Belgian banking sector up to this point. The highest level of concentration of general significance which has been allowed by an EU decision arose from the merger of Fortis AG/Generale Bank in Belgium, which created concentrations in various banking sectors ranging up to 39 per cent of branches in one geographic region and a 38 per cent concentration in corporate loans.

The main transactions which have occurred since early 1997 are: the takeover of BBL by ING; the amalgamation of Credit Communal de Belgique and Credit Local de France into Dexia; the takeover of Banque Paribas Belgique by BACOB which gave

birth to Artesia Bank; the merger between CERA, ABB and KB into KBC; the takeover of Generale de Banque by Fortis followed by its merger with ASLK/CGER into Fortis Bank; the sale of the Belgian network of Credit Lyonnais to Deutsche Bank; and the merger of AXA Royale Belge's Ippa with Anhyp, creating AXA Bank.

The concentration of the five main banks active on the Belgian market (Fortis, KBC, Dexia, BBL and Bacob-Artesia) reached 74% in terms of total assets, 79% in terms of total credits, and 73% in terms of total deposits in 1998.

Another factor of change in the Belgian banking sector is the withdrawal of certain foreign banks because of restructuring in their domestic jurisdiction. This was, for example, the case of some Japanese banks, which closed their Belgian offices because of the banking crisis in Japan and the necessity to rationalize their international network.

4.2.3 Historical review of European market environment: 1994 -1998

The launch of the single market program was the start of a big restructuring process in European banking. Although it is difficult to quantify or document the effects of the program at an overall European level, it led to an important consolidation phase at the level of the individual banks. The clearest effect of the 1992 program was indeed the restructuring of banks in the EU. The number of EU bank mergers increased from 52 in 1985 to 238 in 1990; the number then declined slightly thereafter but remains at a high level. The consolidation occurred primarily at domestic levels, although the number of EU and international mergers also went up. International mergers were concentrated in the wholesale sector, whereas international mergers in the retail sector were very limited.

The EU banking restructuring process introduced new keywords in the banking sector: competitiveness, efficiency, cost controls and profitability. No clear pattern, however, has been discerned at the European level on the basis of consolidated balance sheet data over the period 1985-1994. During this period, European banking

markets were mainly responding to local circumstances and changes in the national environment.

During the late 1990s, the advent of EMU's second and third phases signaled a further shift in the consolidation process. As the euro becomes a physical currency, competition will further increase, margins will reduce and costs should be further lowered. What could this lead to? At a structural level, a further reduction in the number of branches can be expected in countries with excessively extensive branch networks, such as Belgium, due to infrastructural costs. As can be seen from Table 4.2, Belgium shows to be overbanked at the retail level, with the number of inhabitants per branch in 1994 at less than 600 in Belgium, compared to over 3,000 in the UK and around 2,000 + in most other countries.

Table 4.2: Number of Inhabitants per Branch (1994)

United Kingdom	3,509
Sweden	2,916
Italy	2,865
Finland	2,782
Portugal	2,748
Denmark	2,318
France	2,212
The Netherlands	2,117
Germany	1,832
Austria	1,713
Spain	1,102
Luxembourg	1,084
Belgium	594

According to OECD population and banking figures, this has not changed significantly with a 1997 similar ratio for Belgium of 590 inhabitants per branch, although the number of bank branches in Belgium declined from 1994 to 1997 by 1,900 branches.

Banking employment is fairly comparable in the EU and amounts to about 2% of total employment, with the exception of Luxembourg, where it amounts to almost 10%. Reductions in the branch network might also lead to slight reductions in employment levels in the banking sector.

The period under review, 1994-1998, encompassed a period of privatization and innovation in Belgian banking. The Belgian banking sector has always been a pioneer in the field of electronic banking for companies. The PC boom in the 1980s meant that practically every bank started developing software programs to create payment orders to send to banks. Shortly afterwards, new applications followed, such as the retrieval of bank statements, the processing of encrypted bank statements (CODA), the entry of direct debits and checks and the consultation of various types of financial and economic information. Already in the early 1990s, tens of thousands of companies did their banking transactions electronically on a daily basis. Although, technically, there were already a number of Belgian standards around (such as the CIRI standards and the TRASEC security system), every bank used to develop its own system, with its own procedures and standards. If a company happened to work with various banks, this diversity constituted a serious problem. Consequently, clients increasingly called for uniform standards and procedures, and one functional interface.

In response, the three largest Belgian banks (BBL, Generale Bank and Kredietbank) began talks in 1994 about a technological standard. Eventually these talks resulted in the development of a multibanking electronic banking platform, i.e. the Isabel project. Half a year later, three public limited companies were incorporated. IsaServer S.A. for the management of the central computer center with all its functionalities, IsaNet S.A. for the management of the telecommunication network and IsaSoftware S.A. for the development and implementation of the required user software. In the autumn of 1995, Isabel had seven shareholders: the three companies that took the initiative plus the ASLK Bank, BACOB, CERA and the Gemeentekrediet. In November 1996 Isabel began to commercialize the result of two years of development. The electronic services of more than thirty banks are offered today in a single comprehensive multibanking package.

To give an idea of banking's increasing demand on technology as a delivery mechanism during this time period, Table 4.3 provides evidence of the focus on using technology for cost restructuring during the period, indicated by the decrease in branches and agents, and the increase in technology oriented contact points. As a reference point, the number of employees is also shown, to highlight the fact that personnel levels were relatively stable during this period. It is important to understand the constraint of the employment issue on both the banking sector and on Belgium as a whole, given the high level of unionization (over 70% in the Belgian banking sector) and the expensive settlements involved in redundancy. Belgian banking has been a relatively protected sector, with emphasis on cost reduction a recent development during this period.

Table 4.3: Points of Contact in Belgium Source: BVB

Points of contact	1994	1995	1996	1997	1998
Branches	7,791	7,668	7,522	7,358	7,129
Authorized agents	11,368	10,636	10,441	9,901	8,262
Cash dispensers	3,187	3,591	4,162	4,986	5,712
Point of sale terminals	39,430	43,076	48,169	50,022	54,721
Number of phone banking subscribers (x 1,000)	1,437	1,598	1,700	1,949	2,079
Number of employees	76,222	76,133	76,266	76,939*	76,274

* = The increase 1996-1997 is largely a purely statistical effect, due to corrections made to date communicated by some banks. If the same corrections are applied retroactively to 1996, overall employment would be more or less stable.

Privatization was also a major issue during this period in Belgium. In 1988 a hostile take-over bid was made for Société Générale de Belgique by the subsequently famous Italian industrialist, Carlo De Benedetti. After several months of upheavals, Société Générale de Belgique was "rescued" by a "white knight", Compagnie de Suez. Cross shareholdings had existed between the two companies for several years. Société Générale de Belgique did not come out of this raid unscathed; its shareholder base, which was previously fragmented, underwent a radical change, with the shares being

concentrated in the hands of Suez (63%), and other large shareholders, the main one being Fortis AG. Its participating interests, which had previously been spread over a vast number of companies, were refocused on several large Belgian and European companies with an international dimension, changing the Belgian banking landscape.

A key EMU issue to the banking sector has been profitability, measured as return on equity or return on assets. EMU will eat into bank profits from two sides: interest income will slide as a result of the tight fiscal criteria and more intense competition on the loan market. National banking industries which have a large share of their assets invested in government debt, as is the case in Belgium, will need to think about other sources of income. On the non-interest income side, banks lose on foreign exchange and related commissions. To these, one must add the, albeit one-time, costs of the transition.

The following graph in Figure 4.1 shows that a group of countries tend to fall around the European average (EU). The Netherlands and the UK are doing much better, while the problems in the French banking sector during this period are confirmed. The restructuring process seems to be over in some countries, while it is only starting in others.

Figure 4.1: ROA (x) / ROE (y) per country in banking



Return on Assets/Return on equity (average 92-94)

This brief overview gives a birds-eye historical view of the different European banking markets and the way they compared at the start of this period on the basis of some general structural and microeconomic indicators. The graphs illustrate the fact that during this period the differences were still large and that some banking markets might have more problems in adapting to the euro than others. A further phase of restructuring has therefore been expected, and evidence suggests it is under way.

Banks are focusing closely on the cost and revenue side of the business. An obvious target on the cost side will be the branch networks, and probably, employment. On the revenue side, banks are re-orienting their business and focusing on their competitive strengths. Revenue growth from the domestic deposit and loan business is thought to be limited, therefore growth will have to come from bancassurance, investment banking or fund management. The mergers of the late 1990s, with the inclusion of insurance into the banking groups, and the mixtures of retail and corporate banking into large banking organizations are driven by some of these issues.

4.2.4 Competitive situation of last three years

The largest banks in Belgium are listed below, all victims of consolidations which have occurred since 1997. These banks combined in 1997 had over 60% of the net banking income in the country:

- 1. Group Fortis (1)
- 2. Group KBC (2)
- 3. Group BBL (3)
- 4. Group Dexia (4)
- 5. Group Artesia (5)
- 6. AXA Bank (6)

(Source: Belgische Vereniging van Banken (BVB))

Comprised of:

(1) Generale Bank, Generale Belgian Bank, Bank Belgolaise, Bank van de Post, ASLK en Krediet aan de Nijverheid

(2) Crédit Général, HSA-Spaarkrediet, Bank van Roeselare, Fidisco, Krefima, ABB-Verzekeringen, Cera en Cera Investment Bank

(3) BBL, SEFB-Record Bank en ING Bank (Belgium)

(4) Gemeentekrediet van Belgie (GKB), Credit Local de France and Banque Internationale a Luxembourg

(5) Bacob, Paribas, Eural-Unispar, Parfibank, Gesbank, Banque Drèze en één derde van Groep Landbouwkrediet

(6) Spaarbank Anhyp, Ippa Bank

4.2.5 Regulation of Belgian Banking

The Belgian banking sector is regulated by the Act of March 22, 1993, recently amended by an Act of March 9, 1999, implementing the so-called BCCI Directive. Under the Banking Act, the Banking and Finance Commission (BFC) has been granted the power to supervise the qualification of all shareholders holding an interest of at least 5% in a Belgian credit institution. This is to ensure that its managers are fit and proper and to verify that not only is the minimum standard EU risk asset ratio properly complied with on an individual and consolidated basis, but also, the specific additional Belgian gearing and fixed assets ratios.

According to the Banking Act, when a bank is taken over, sells its activities or merges with other financial institutions, the BFC has the right to oppose any transaction which it believes would generate a risk for the safe and careful management of the bank because of the identity of its new shareholders, or because of the bank's new financial structure.

According to Article 24 of the Banking Act, the BFC is entitled to refuse any acquisition of an interest of 5% in a credit institution if the acquiring shareholder does not present the required credentials to guarantee the safe and careful management of the credit institution.

The control of the sound management of the bank is ensured through an 'autonomy protocol' signed by each bank, its qualifying shareholders and the BFC, under which the BFC is recognized the right to approve the designation of the chairman of the board of directors and all managing directors. The managing directors must be members of the full board, where a clear distinction is made between executive members and non-executive members. It is the full board that sets the policy of the bank, but the actual management of the bank is entrusted to the managing directors only. Under a recent modification of the "autonomy protocol", the non-executive directors representing the shareholders may hold a majority of seats within the full board.

The control over the annual and consolidated accounts of the credit institution is carried out by the BFC with the assistance of the statutory auditors of the bank which must be appointed on a list of auditors approved by the BFC and must report any material finding to the BFC in addition to the monthly statements which have to be submitted by the bank to the BFC.

The BFC approved all mergers and takeovers mentioned above, some of which also needed clearance from the EU Commission under the EU Merger Regulation. The most difficult question, which the BFC had to deal with in the context of transnational mergers, was how to share prudential control with the competent authorities of other EU member states. In the case of the two Belgo-Dutch bancassurance conglomerates, Fortis and ING, an agreement was signed with the Dutch authorities granting coordinating powers to the authority which is competent to supervise the activities carrying the heaviest weight in terms of solvency requirements. Under this criterion, it is the BFC that has received responsibility to supervise the banking activities of Fortis (Van der Haegen, 1999). In the case of Dexia, the agreement between the CBF and the French Commission bancaire provides, on the contrary, for a parallel control but on a unified basis (Van der Haegen, 1999).

It is also the BFC that acts as competent authority to receive all required notifications under the EU directives, on freedom of establishment and freedom to provide services, and to approve the setting up of a Belgian branch or the solicitation of Belgian customers by non-EU credit institutions.

It is the generally accepted view that the present-day Belgian banking market is an open market. This statement is no doubt accurate in so far as it refers to the fact that a number of locally established banking institutions are either Belgian subsidiaries of (EC or non-EC) parent credit institutions, or are local Belgian branches of credit institutions incorporated in other (EC or non-EC) countries.

However, in many other ways, the Belgian market is a very protected market. This can be illustrated by a few examples (Owens, 1997):

- As a rule, withholding tax is applicable on interest paid to foreign lenders by Belgian-based clients (if they are not themselves financial institutions). This makes traditional cross-border lending difficult, and sometimes impossible, forout-of State lenders. In particular, it is a very significant barrier to cross- border lending by out-of-state credit institutions to Belgian-based private clients and small and medium enterprises.
- The very large public borrowing requirement in Belgian franc translates into a competitive advantage for local Belgian banks which have a secure Belgian franc deposit base at the retail level.
- Even if large amounts of capital have been "expatriated" by Belgian residents over the years, particularly in immediately neighboring countries, these Belgian franc deposits are automatically "recycled" into the Belgian banking market under the form of deposits in Belgian franc made by the foreign credit institutions concerned (including subsidiaries of Belgian banks) on the books of Belgian banks.
- Similarly, there is to a large extent automatic "recycling" of a large part of (Belgian franc) insurance premiums and pension fund contributions into Belgian franc fixed-interest assets (which mean, in practice, Belgian Government bonds). Article 104 of the Treaty of Rome prohibits privileged access of the Belgian Government to financial institutions (including insurance companies and private pension funds) by way of enforced investment in Belgian Government bonds (or short-term paper). However, the prohibition contained in Article 104 is without prejudice to investment rules justified by supervisory requirements. This is the case, presently, as a result of the need for those institutions to ensure an adequate

matching between their liabilities in Belgian franc and their assets in Belgian franc.

- Legal regulations (of doubtful validity in terms of Community law) prohibit Belgian residents (other than Belgian financial institutions) from acquiring Belgian Government debt issued abroad.
- Belgian residents active in a large segment of the Belgian Government debt (socalled O.L.O. bonds) are required to have their O.L.O. account with the Belgian National Clearing System, run by the Belgian National Bank, to the exclusion of competing, private, clearing systems.

The controlling powers of the BFC have therefore played a considerable role in monitoring both the financial soundness and the development of the banking sector over the years. But its challenge lies in the very nature of the developments described above. Due to the on-going move to international consolidation, removal of some of the protectionist measures, and the fierce competition of financial products from non-banking sources (such as insurance products, pension funds or investment funds), the trend in the future will probably lie in an increased coordination between the controlling authorities of the banking, insurance and securities industries, both at national and international level. Important new studies will have to be devoted to the definition and monitoring of the risks created by the various new products. These are constantly being developed not only by the banking sector but also by the other competing financial institutions. The competitive advantage ("monopole des remplois") presently enjoyed by local Belgian banks having a large local deposit base, when it comes to lending in Belgian franc will be reduced significantly when these banks have to operate in a single currency environment (Van der Haegen, 1999).

4.2.6 Branch Banks

Another area that has been changing the Belgian banking environment during the end of this period, and since, is the sales structure of the branch banking network. Table 4.4 shows the number of contact points for bank clients, including bank offices.

Table 4.4:	Number of Cont	iource: BVB		
		Total full-ti	Total full-time agents	
	Number of bank offices	Total	Total working in bank offices	Total sales points
1994	7,791	11,368	1,676	17,483
1995	7,668	10,636	1,659	16,645
1996	7,522	10,441	1,946	16,017
1997	7,358	9,901	1,874	15,385
1998	7,129	8,262	1,233	14,158

Starting approximately in 1995, banks realized that their independent agents were doing quite well, and wanted a piece of that profit, so the main banks (save one, AXA bank, which went to remake its network into independent agents only) started buying out the agencies. Therefore the number of agents dropped, as did the number of sales points. As a structural issue, this may have been a detriment to productivity, as the productive sales points, the agents, were not incentivised to be productive, as the banks came in and took over the businesses. The level of competition makes that margins are tight and the retail banking technology relatively advanced. The majority (+/- 75 %) of the income of the banks is still obtained out of the intermediation rate between collecting deposits and granting credits.

Belgium is seen in OECD (1999) comparison as overbanked, both in terms of the number of banks and the number of branches. A gradual decline each year in the number of outlets has not really changed that, given the rise in phone, modem and automated teller machine-based banking. The number of bank branches has fallen from 7,668 at end-1995 to 7,129 at end-1998. Overbanking is particularly acute in the

northern region of Flanders, which has 69.7% of all sales outlets. While Flanders has a larger population than the southern region of Wallonia and is also more prosperous, it nevertheless has a highly disproportionate number of outlets. Consolidation and competition are therefore pronounced.

There are four types of domestic banks recognized under Belgian law: commercial banks, savings banks, securities banks and local authority savings banks. The distinction between commercial banks and savings banks increasingly has only historical significance. There were 45 commercial banks at end-1999 (compared to 49 at end-1998). Several of these are owned by other commercial banks, but have retained their own banking license. There were 26 savings banks (compared to 29 at end-1998), including nine credit unions in the Credit Professionnel network, most of which was sold in January 2000 to Crédit Mutuel of France. Several other savings banks on the list have retained their individual banking licenses despite being taken over by commercial banks. There were three securities banks (compared with two at end-1998), a category that brokers can use to broaden their sphere of activity, and one local authority savings bank. Of the domestic banks, 27 were foreign-owned at end-September 1999 (the latest date for which figures are available, source of all figures is the BVB).

The other possible statutes under which banking services are provided are branches of banks registered in a country outside the European Union (of which there were 14 at end-1999, the same number as end-1998), representative offices of foreign banks (37 at end-June 1999), and banks making use of the European Economic Area "single passport" system. The "single passport" system enables them to operate in Belgium on the basis of home country supervision. There were 292 of these at end-June 1999, compared with 273 at end-1998.

The combined balance-sheet total of all Belgian and foreign banks active in Belgium rose 1% to Euro 752.6 billion at June 30th 1999 (latest figure available). Larger banks have been growing at the expense of both smaller and foreign-domiciled banks. The cost/income ratio of Belgian banks has come down from 71.6% in 1993 to 63.3% in 1998, and return on assets (ROA), rose from 0.28% to 0.31% over the same period. Return on equity has been more volatile. From 8.70% in 1993, it rose to 9.91% in

1997, but dropped back to 8.54% in 1998. Foreign banks had a cost/income ratio of 75.4% in 1998 and ROA of 0.29%,

The profitability of Belgian banks is steadily improving. In its 1998 annual report, the National Bank of Belgium (the central bank) notes that the return on equity was 11.57% for the first nine months of 1998, compared to 10.87% in 1997 and only 8.35% in 1995. The return on assets has gone from 0.24% in 1995, to 0.30% in 1997 and 0.34% in the first nine months of 1998.

The central bank observes that the improvements have essentially been at the large banks. Small to medium-sized banks, which have not yet been taken-over, are finding it hard to keep up with the trends in financial markets that would enable them to improve profitability by moving from traditional forms of lending and borrowing into new markets and instruments. The central bank also identifies room for further amalgamation, since the sector is still only moderately concentrated when measured by the Herfindahl index used by the U.S. Department of Justice to measure concentration. [The concentration of the banking industry as measured by the Herfindahl index is defined as the sum of squared market shares of assets of all banks in each country.] A number of banks are likely to be looking to merge or be taken over, despite the fact that the number of Belgian-controlled banks has already dropped from 79 in 1992 to 56 in September 1998.

The reliance of national banks on business in currencies other than the Belgian franc has been increasing. The volume of lending outside Belgium was equivalent to 112% of GDP in 1998 (source: EIU Country Reports, 1999). This compared to an average of 49% for the Netherlands, France and Germany, the three countries that Belgium frequently uses as benchmarks for economic performance: they are the nearest neighbors, the closest competitors and the main trading partners.

The openness of the Belgian economy is creating a demand for forward transactions in foreign exchange, and the presence of a large number of foreign banks drives heavy volumes of foreign lending. Another key trend in 1998 was a marked increase in the propensity of Belgian companies to lend to non-resident members of their group. Strong cashflow and low interest rates were key contributing factors. The ratio of foreign to domestic assets of Belgian-registered banks rose from 34.8% to 37.4% between 1996 and 1998. Although Belgian banks have been actively diversifying into operations with non-euro-zone markets, particularly in emerging economies, this habit will undergo a radical change with the growth of the euro. On the one hand, the need for much forward cover will drop away because companies will be trading in their domestic currency with their main trading partners. On the other, Belgium will be able to impose its domestic currency more readily in transactions with countries outside the euro-area.

The advent of the single European currency has accelerated the process of consolidation, because domestic banks stand to lose up to 30% of their current revenues from their foreign-exchange businesses. They are also seeing tougher competition across the range of services, from asset management to investment banking. The euro will offer new opportunities for the coordination centers of international firms operating treasury management from Brussels, as they will be able to run centralized cash- pooling and netting arrangements. But foreign banks will be in keen competition with the Belgian banks for this business.

The banking scene is very international and foreign banks are well represented. Nonresidents account for a very large proportion of banking business: 45.1% of deposits and 44% of lending at end-June 1999. Resident commercial banks account for around 90% of total short-term lending to business and around one-half of consumer credit. Non-resident banks are relatively much more present on the interbank market, though their corporate and consumer business is growing steadily.

The nature of the bank business has been changing since implementation of the Second EU Banking Directive in 1993, as disintermediation and securitisation (transforming loans into negotiable securities) make off- balance-sheet activities more important and serve to increase foreign-exchange business.

The implementation of EU legislation in the local banking sector has provided a new degree of uniformity of legal status, both for the traditional groups of credit

institutions (banks, public credit institutions, savings banks) and between Belgium and other EU countries.

The major Belgian domestic banks are universal banks, that is, they handle commercial and investment-banking functions. All the leading banks have ties to insurance companies, leasing and factoring organizations. Most also have in-house broking divisions and investment arms or stakes in venture-capital companies.

Three factors have contributed significantly to radical changes in the banking landscape in the last five years: the government's withdrawal from bank ownership; mergers and takeovers and moves by domestic banks to extend their service areas; and foreign banks moving into the country. The only remaining government-owned bank is the residential mortgage operation, OCCH. This is likely to be privatized or part-privatized in 2000 if a buyer can be found. The government indirectly owns the Post Office Bank through ownership of the Post Office, although Fortis is involved in assisting the Post Bank with its operations.

Of the five largest banks, three are foreign-owned or part of cross-border alliances. They are KBC (Belgium); Banque Bruxelles Lambert (BBL) (owned by ING of the Netherlands); Artesia Banking Corp (Belgium); Fortis (The Netherlands); and Dexia (Belgium/France).

Source: BVB

Bank	Assets #
Generale de Banque	8,409.3
KBC (ex Kredictbank)	5,640.1
Credit Communal	4,252.1
Banque Bruxelles Lambert	4,207.9
BACOB	2,605.4
Artesia	673.1
Anhyp Savings Bank	397.9
Deutsche Bank**	397,4
CBC Banque	359.0
CENTEA	354.3

Table 4.5: Top Ten Domestic Banks in Belgium

Ranked by Assets as of End-1998-BFr Billion

#Consolidated 1998 balance sheet, with the exception of Artesia, which is non-consolidated. Of the banks in the top ten, Generale de Banque is now part of the Fortis group; BBL is part of the Dutch ING group; Credit Communal is part of the Dexia group; Artesia is becoming part of Dexia, but has been a holding company, which controls Bacob; Anhyp has been merged with Ippa, has been renamed Axa Bank and is the Belgian banking arm of the French insurance group Axa; CBC Group has since been fully incorporated into KBC.

**Deutsche Bank purchased the Belgian operations of Crédit Lyonnais and operates them as a separate retail operation from its pre-existing foreign bank presence.

In terms of strategic positioning, Artesia, Fortis and ING/BBL tend to position themselves as Benelux rather than Belgian banks. Artesia has also taken a foothold in northern France. The emphasis at Dexia is on becoming the banker to the local authorities of France and Belgium, but it also has ties in Spain, Italy and the Netherlands. KBC, on the other hand, has been expanding into Eastern Europe as a means of profiling itself and finding room for growth outside the crowded Belgian banking market.

Post-merger, large Belgian banks were active in acquiring stakes in other financial institutions in 1999. Of note was the acquisition of Banque Vernes, a French investment and commercial bank, by Artesia. Dexia obtained majority control of Banque Internationale de Luxembourg (BIL). KBC acquired a 65.7% stake in CSOB

Bank (Ceskoslovenska Obchodni Banka) of the Czech Republic, the country's fourth largest bank, as part of its expansion to the east. KBC also has minority stakes in Kredyt Bank of Poland and Kereskedelmi es Hitelbank of Hungary; these takes were increased in 1999. KBC also acquired DE Shaw Financial Products, a specialist in share derivatives and convertible bonds of the US, complementing KBC's existing strength as one of the leading brokerage houses through KB Securities. KBC also purchased the 25% it did not already own in Irish Intercontinental Bank at mid-year 1999. KBC also that year bought out the stakes in the Antwerpse Diamantbank (ADB) held by Generale Bank and BBL, bringing its holding to 87.2%. KBC is expanding the bank's operations to the US and India, and in 1998 pioneered securitisation of diamond-backed assets. While ADB is unique in being dedicated to the diamond business, other Belgian banks have specialist divisions serving this market.

The restructuring of Artesia and Bacob was completed in May 1999. Artesia Banking Corp now consists of a wholesale and corporate bank (Artesia Bank), a retail bank (Bacob), and an insurer (DVV/AP).

Most recently merged Groups began in 1999 to restructure and integrate their various past acquisitions into more rational structures and started re-branding their operations (EIU, 1999). Fortis, for example, gradually moved to greater use of its name in the operations of Generale Bank and CGER/ASLK. The Dexia name has been increasingly replacing the use of the name Crédit Communal, and the ownership structure was streamlined to remove a layer of cross-ownership. In the process, the Belgian local authorities became minority rather than majority shareholders. This is symptomatic of a shift in attitudes. The network of companies and cross-shareholdings that had been established to protect national sensitivities was hampering rapid decision-making because of the need to get approvals from a series of boards.

As domestic banks seek to improve their international links, foreign banks have been taking increasing stakes in the local banking sector. According to calculations by the Belgian Banking Association, Belgium is the third most open banking market of the world's ten major banking nations. In 1997, a recent year for which the IMF data underlying the statistics is available, 50.6% of Belgian lending was outside the

country (EIU, 1999). This placed Belgium only slightly behind the UK, and both were far behind Luxembourg, the leader by this criterion. In the past, most foreign-owned commercial banks in Belgium were principally active in corporate finance, foreignexchange transactions and dealings on the money market. Only a few operated branch networks, and those that did, for instance Citibank, were generally set up under Belgian law.

4.3 Industry figures

The Belgian Banking Federation (BVB in Dutch) does an annual survey of all the banks in Belgium as to their IS spending. The results on an overall basis are published in the 'Statistisch Vademecum van de banksector' by the BVB. This survey data is shared by the top seven banks informally, as a benchmarking exercise (more on this in the case study section of this research).

The industry figures allow this research to analyze the role of information systems (IS) in increasing productivity and operational effectiveness in the Belgian retail banking industry during the period 1994-1998. The analysis focuses on the quantitative comparison of the top seven banks during this period, and which bank used the inputs, which include both IS and other non-IS capital and labor, to their best advantage.

This time period was characterized by the first phase of privatization at state-owned ASLK-CGER (now part of Fortis) and reorganization efforts at most banks, aiming to increase productivity in the face of mounting demands by shareholders for better returns. Spending in IS projects was part of the efforts in productivity during this period, with many of the efforts augmented by outsourced assistance.

A driving force behind the interest in this proposed research is the continuing need of Belgian banks to assess the IS role in profitability and productivity of operations due to environmental and competitive changes in the market. Indeed, while a first round of consolidation has taken place, the resulting groups are still of modest capitalization and asset size in comparison to neighboring country-based groups. Belgian banks, or

Industry Analysis

their parents, therefore must pinpoint the IS role as part of their preparation for almost inevitable further consolidation.
Industry Analysis

Table 4.0. Total Industry - Input a	in Output	a iguites	bource.	DVD star	154105
Inputs (in Billion BF)	1994	1995	1996	1997	1998
IS Labor	10.9	10.9	15.2	15.9	17.8
IS Capital	29.3	30.6	29.0	32.3	39.8
Includes: HW and networks (Computer	9.9	9.8	12.8	12.4	13.6
Equipment)					
Total IS Costs	40.2	41.4	44.3	48.2	57.6
Non-IS Labor	165.1	167.0	170.7	171.6	175.5
Non-IS Capital	119.1	120.4	133.8	148.5	163.8
Ratios	5				
IS Cost as a percentage of total cost	12.4%	12.6%	12.7%	13.1%	14.5%
IS Cost as a percentage of total bankproduct			7.9%	8.4%	8.2%
IS Labor as a percent of total IS cost	33.7%	33.6%	45.3%	49.5%	51.7%
IS Labor as a percent of total Labor	6.2%	6.1%	8.2%	8.5%	9.2%
Total Labor (costs)	176	177.9	185.9	187.5	193.3
Total Labor (number of employees)	76.222	76.133	76.266	76.939	76274
Total Investment	22.8	24.2	26.4	28.4	28.4
Total Cost	324.4	328.9	348.7	368.3	396.9
Total Bankproduct	437.1	465.1	516.9	535.2	619
Outputs (in Billion BF)	1994	1995	1996	1997	1998
Productivity					
Sum of Total Loans and Total Deposits (billion BF)	23374	24853	27062	29205	29349
Or					
Net Income of the bank (Revenues, in billion BF)	55.3	53	68.5	76.5	89.3
Profitability					
ROE = "net income as a percentage of total shareholders' equity"	8.05%	7.79%	9.47%	9.91%	8.54%

Table 4.6: Total Industry - Input and Output Figures Source: BVB statistics

Table 4.7: Segmentation of Bank Personnel

	1997	1998	
Management	4.1%	4.0%	
Cadre	35.4%	36.7%	
Interim Personnel	58.7%	57.8%	
Blue Collar Workers	1.7%	1.4%	
C DIM			

Source: BVB

Chapter 4

4.3.1 Discussion of BVB figures in terms of growth and revenue

Although the number of employees has stayed relatively constant, a number of decisive factors have changed the structure of the Belgian banking industry during this period, discussed below using the BVB data as reference points. One is the type of employees used, both in IS and non-IS activities; the second is the level of automation in all levels of bank offices, including branches and regional centers.

There was a significant increase in IS labor costs starting in 1996, in line with the rest of the industry, as a trend for outsourcing project increased bottom line spending in this area. This can be seen in that total labor costs also increased noticeably in 1996, although number of employees did not. For IS, if the information on project start dates would be available, it would be interesting to see if this matches with the period where many in the banking industry started with SAP R/3 and other ERP projects. For non-IS, the comments made previously about agents becoming employees may explain the increased non-IS labor costs, including social charges.

In comparison to total IS capital spending, which had a relatively constant growth rate per year during this period, the portion that was hardware and networks also jumped significantly between the 1995 and 1996 period. Again, the types of projects started during this period of time may have an effect on this figure, perhaps focusing on branch automation, since an increase in hardware spending together with networks might denote volume of boxes, not new mainframe purchases.

Interestingly, total bankproduct growth, year on year, also jumped slightly in 1996, although any correlation to IS spending cannot be stated.

4.4 Results

4.4.1 Industry Level Analysis

Looking at the results of the industry level of the quantitative research, the findings are not conclusive.

H1a: IS investment makes positive contribution to output (i.e., the gross marginal product is positive).

H1b: IS investment makes positive contribution to output after deductions for depreciation and labor expenses (i.e., the net marginal product is positive).

H2: IS investment makes zero contribution to profits or stock market value of the firm.

For productivity, both hypotheses 1a and 1b are true for the overall industry for net income as an output, but not always true for this output when assessing the individual leading banks. The main difference between overall industry and individual banks for the first two hypotheses was mainly due to the lack of impact of IS Capital on certain individual bank productivity. This may be caused by spending patterns during this time period. For the third hypothesis, the hypothesis is true for overall industry for IS capital, but not for IS labor, leading to the analysis that there are stronger net benefits for investment in equipment than in labor, which may be explained by the consultant component of the staff, which is an assumption that could be tested further with more in-depth data.

For the other main productivity measurement using the sum of loans and deposits, however, the hypotheses were all negative for the overall industry. The initial explanation is that the coefficient for non-IS labor showed a much stronger relationship with this output, which, when tested, may show a correlation between the size of branch network (in terms of additional personnel) and the total financial size of the bank.

The profitability output of ROE, which appears to be the measurement used the most by the banks themselves according to initial interviews, was also negative for the

overall industry on all the hypotheses. An explanation here might be that the stronger relationship shown by the data between non-IS capital and ROE during this period of banking expansion might have an impact on the results. A more detailed analysis on the overall data and on the individual banks could present a more refined picture of the situation during this time period, if a higher level of data were available.

4.4.2 Firm Level Analysis

The input variables for the seven banks for IS capital and IS labor are predefined by the annual survey of Belgian banks by the Belgian banking association (ABB / BVB). This survey categorizes IS capital spending into hardware, software and network components, and categorizes the IS labor component into permanent and temporary components. The non-IS labor variable can therefore be calculated by subtracting the IS labor component from the total labor cost figures per bank, and the non-IS capital variable is calculated from subtracting all of the other three variables from the total cost figure per bank.

Studies of productivity in the banking industry differ on the issue of what constitutes the "output" of a bank. The various approaches researchers have chosen to evaluate the output of banks may be classified into three broad categories: the assets approach, the user-cost approach, and the value-added approach (Berger and Humphrey 1991). This was previously discussed in Chapter 3.

For this research, the outputs (denoted in the equation as Q) will be defined by the assets approach, which considers banks as "financial intermediaries" between depositors (or those who provide money to the bank) and borrowers (or those who receive money from the bank). The assets approach of determining a bank's outputs is exemplified, for example, by Mester (1987), who argues that "output is best measured by the dollar value of earning assets of the firm", which can be defined for this case as the sum of the loans and deposits. For the productivity analysis, we use the sum of Total Loans and Total Deposits for each year as representative of output.

Output could also be viewed as either net income, return on equity (ROE) or return on assets (ROA), given the other approaches used in productivity research, but the initial analysis using SPSS found that the sum of loans and deposits was a more effective method of analyzing the production function relationship.

4.4.2.1 Regression analysis data: 1994-1998

Equation:

$$\begin{split} Q_{y1} &= \alpha_1 + \alpha_2 D_1 + \alpha_3 D_2 + \alpha_4 D_3 + \alpha_5 D_4 + \alpha_6 D_5 + \alpha_7 D_6 + \beta_{y1} + \beta_1 (C_{y1}) + \beta_2 (K_{y1}) + \beta_3 (L_{y1}) \\ &+ \beta_4 (S_{y1}) + e_{y1} \end{split}$$

Where $\alpha_{1.7}$ are the intercepts for each bank, $D_{1.6}$ are the dummy variables for the individual banks, Q is the output of the firm, and:

C = IS Capital

K= Non-IS Capital

S = IS Labor Expenses

L = Non-IS Labor Expenses

and $\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are the associated output elasticities. (where y1 is the first year of data available, with y2, y3, etc. depending on available data).

 $R^2 = 99\%$ Durbin-Watson = 2.487

Model	Unstd Coefficient	Std. Error	t-stat	significance
Constant	6.0	.646	9.294	.000
LN C	1.533E-04	.046	.003	.997
LN K	-2.532E-02	.027	947	.360
LN S	.440	.041	10.640	.000
LNL	.516	.221	2.335	.035
Dummy 1 (Bacob)	.490	.250	1.963	.070
Dummy 2 (GB)	2.246E-02	.094	.238	.815
Dummy 3 (BBL)	7.198E-02	.046	1.558	.142
Dummy 4 (KB)	.105	.057	1.833	.088
Dummy 5 (Cera)	.114	.186	.616 .548	
Dummy 6 (GKB)	.178	.055	3.221	.006

No dummy: ASLK

The first step is to check if the equation is correctly determining the linear relationship. By using a Durbin-Watson coefficient, the researcher can test for first-order autocorrelation. The Durbin-Watson coefficient for the regression was 2.487, which was fairly close to 2 which is the optimal figure for the calculation. This means that the fit of the equation is correct, and the researcher can then start to use the data to analyze the relationship between the independent and dependent variables.

Next, the relationship between the inputs and the outputs is examined. Initially, both net income and sum of loans and deposits were examined. However, in using net income as the output, all the dummy variables had negative coefficients. This would mean that the bank without the dummy variable, in this case ASLK, would be in the

best position in terms of comparison, which was not quite explainable in terms of the variables entered. Also, there could be a factor of balance sheet manipulation prior to the privatization and merger. Since the dummy variables for sum of loans and deposits were all positive, the researcher decided to focus on that output factor initially.

For sum of loans and deposits as the output variable, the only negative coefficient (β) for the four input variables was non-IS capital (ln K). This could be explained by the fact the physical assets of the banks (buildings, furniture) may not be closely related to bank results. It is interesting to note that the elasticity (coefficient β) of non-IS capital, being negative, implies that IS capital investment is relatively better than investment in non-IS capital. The highest coefficients were both non-IS and IS labor, in which the increased productivity of labor can be associated with a high increase in the output of the bank. This is perhaps reflective of the Belgian banking industry where the emphasis on service delivery implies that labor is a more worthwhile investment than capital.

In the estimation of a Cobb-Douglas production function, it is usual to expect a relatively high correlation between the independent variables. In this case, there is the likelihood of high correlation between IS capital and IS labor investments. As Kennedy (1985) notes, "The existence of multicollinearity in a data set does not necessarily mean that the coefficient estimates in which the researcher is interested have unacceptably high variances. The classic example of this is estimation of the Cobb-Douglas production function: the inputs capital and labor are highly collinear, but none the less, good estimates are obtained." The t-statistics we obtain for IS capital imply that IS capital is not a significant variable in the regression; therefore this may not be an issue in this case.

4.4.2.2 Review of firm-level results

In reviewing the comparison of the different banks under the sum of loans and deposits output, the 'best' bank in terms of both coefficient of elasticity and in terms of significance was the bank with dummy 1 (Bacob), which is not that surprising. During this period, Bacob had the reputation as being the most innovative bank in its use of technology, with leadership in telephone banking and PC banking. Bacob's IS infrastructure also was a mix of 2/3 internal and 1/3 external personnel, which may have been an optimal use of personnel costs for that bank at that time, an assumption which could be tested further by segmenting the personnel costs into temporary and permanent and rerunning the regression.

The non-dummy variable bank (ASLK) was the 'worst' of the comparison, as all of the dummy variables were positive and higher than zero coefficients. The position of ASLK in comparison to other banks during this period may again be related to its privatization and then forthcoming merger with Generale Bank during the period, or it could have to do with the ALSK IS policy against outsourcing, which may have created a productivity impact in a cost comparison to others in industry who did use external personnel.

Generale Bank (dummy 2) during this period had extensive IS projects that were mainly outsourced at a too high a cost for the outcome (by their own admission), which could explain their poor comparison to others in this analysis. KB also had outsourced projects, but obviously more cost effective results, both shown in the comparison ranking and in the significance of the result (dummy 4). This period concluded with the KB merger of Cera (dummy 5), which analysis of the following years after 1998 would be interesting for future research. GKB (dummy 6), now Dexia, also had a significant result, although at this point it is unclear what events during this period may have caused the results given here.

4.4.2.3 Summary and Conclusions

The IS and non-IS labor components had a higher significance and coefficients that those of non-IS capital, which was negative, and IS capital, which was not significant. It appears, for Belgian banks, that the effective use of personnel, both IS and non-IS, could be closely aligned to the productivity of the bank's assets based on output. Perhaps the banks in the study may have reached the margin return in IS capital investment, but still can find, or could have found, significant benefit in hiring and retaining IS labor. The use and cost structure of IS personnel appears to be a key factor in the IS productivity of the banks. But the other issue to retain in terms of productivity and bank labor appears to be that about 75% of the bank personnel are unionized, which may be a factor in any future corrections of personnel cost and productivity gains.

Given the high unionization and the large number of branches in Belgium (590 people per bank branch in Belgium, according to OECD (1999) data, in comparison to other EU countries at an average of 2,500), the non-IS cost components may be difficult to shift in the short term. In gaining productivity in the sector, banks must find a way to lower the cost per head of the non-IS personnel, and to maximize the cost/performance of the IS personnel.

There has been much debate on whether or not the investment in IS provides improvements in productivity and business efficiency. Several studies both at the industry-level and at the firm-level have contributed differing understandings of this phenomenon. Using the BVB and individual bank data collected, this paper suggests that in Belgium the additional investment in IS capital may have had no real benefits in the period reviewed and may have been more of a strategic necessity to stay even with both the domestic and international competition. However, the results indicate that there are substantially high returns to increase in investment in IS labor, and that retail banks might consider a shift of their emphasis in IS investment from capital to labor and labor retention.

By using the dummy variables, the researcher is able to assess the relative positions of the banks in terms of the productive use of these inputs. Given these initial results, further investigation of the role of personnel costs as a competitive factor could be undertaken. This could be further clarified by adding an index to see differences by number of branches per bank together with personnel costs per branch, or by number of permanent personnel, split by IS and non-IS component.

4.5 Impact of Industry Structure

The Belgian banking environment has continued to change due primarily to the following important factors:

- the single currency has revolutionized the workings of European financial markets, reinforcing the ongoing desintermediation trend of the past few decades; banks have reacted to this phenomenon by diversifying their sources of revenue, notably in the fields of asset management and investment banking.
- the gradual return to budget orthodoxy has resulted in the disappearance of public deficits in an increasing number of countries; this also had significant consequences, especially in a country such as Belgium where the degree of intermediation of the public debt is traditionally important;
- finally, the emergence of new communication technologies has forced the retail banking sector to rethink its global distribution strategy.

While these transformations generate new opportunities, they also imply the emergence of new risks, which must be managed with utmost prudence, and, finally, in a sector that is traditionally fiercely competitive, they further increase competition.

4.5.1 The Changing Nature of Bank Branches

In a country that remains divided linguistically as well as ideologically, and by class, banking followed from these tendencies. Moreover, government initiative created certain institutions. Social-political movements started their own banking cooperatives. The christian-democratic workers' movement bank cooperative, originally organized per province as a cooperative, came together into what was eventually to become BACOB, and ultimately Artesia, from the 1960s onwards. Government initiative created ASLK-CGER as a government-backed savings bank, and Crédit Communal-Gemeentekrediet as the municipalities' banker. The former was to merge with Generale Bank into Fortis Bank and the latter became Dexia's mainstay.

Generale Bank, and Paribas even more pronounced, on the other hand, were seen as upper- and upper middle class serving banks. Kredietbank was, and remains, strongly catholic and Flemish. Cera, the other part of what is now KBC, was the farmers' credit union cooperative. Anhyp was until 1995 a bastion of, largely catholic, Antwerp (French-speaking) bourgeoisie. To the one looking at Belgian banking from the outside, there is little wonder why a society so fragmented and parochial was overbanking itself at every street corner. (Over-schooling, in the sense of the fragmentation of the schooling system into a public and a catholic system, remains as of today).

All of this has, and is still changing, quickly, partly, possibly even mainly due to outside pressures as outlined above, partly by the dismantling of class and ideological, and to a degree also linguistic, structurations in the modern Belgian socio-economic landscape. While some mergers may be ideologically comfortable (KBC resulting, for example), others go across deep class and other divides (Fortis); the suggestion may be that these divides are no longer as deep, or perceived as such, to matter when it comes to viability and efficiency in a European context.

4.5.2 Direct Banking

Direct banking has just stared to pick up in Belgium, according to a recent study by Datamonitor, the market research organization. This is not quite true, as direct banking, in the form of either telephone or ATMs, has been in Belgium for at least ten years. But Internet banking is just starting to be a delivery option in Belgium, slowed by speed of access, reliability and inadequate convenience. In Europe, according to the Datamonitor research bureau, around 4.5 million bank customers used the web in 1999. That's less than 2 per cent of consumers. However change is afoot. By the end of 2000, estimates J.P. Morgan, some 20 million Europeans will do their banking online. Pointing the way forward is online share-trading. J.P. Morgan says that there are 2.9 million Europeans online to the stock exchange, with a greater than twofold increase since December 1999 (Datamonitor, 2000).

Banks know they need to be more pro-active - to improve staff awareness of the Internet's importance and to train them to use it. This would avoid embarrassing incidents such as the one at Fortis where a customer phoned to complain about problems reinstalling the Internet banking software - only to be told it was impossible to carry out that transaction on the web, and that the only solution would be to use the telephone banking service or to come into a branch. Sometimes it appears that banking software is designed to discourage potential online customers. Slow-loading Java applets and user-unfriendly environments are everywhere. Common problems include compatibility between the customer's computer hardware and the bank's requirements, particularly regarding software. And many consumers still need to be educated (Trends International, 1999).

However, this Internet delivery option is starting to show numbers in Belgium. Fortis fights shy of revealing numbers for its online customers. Belgium's biggest bank says some 10 per cent of stock exchange transactions are carried out on the Internet. But not all of its customers are active on the stock exchange. Fortis gives a figure "not far off 10 per cent of active customers" carrying out their banking transactions by PC or Internet by the end of the year. Ignoring those customers who are not very active, and who log in directly to the BBL's Home Bank system by modem (using a non-Internet connection), BBL's Home Bank roughly has a figure of 50,000 customers active on the web. Dexia states that 75,000 customers have received its package needed for online transactions. As elsewhere, though, a significant percentage of "online"

customers apparently does not use the Internet for transactions, therefore Trends International extrapolates a figure of around 40,000 to 50,000 Internet customers. KBC claims to have some 40,000 online customers (Trends International, 1999).

4.5.3 Costs of Transactions

Banks frequently focus on the cost of transaction, and how they can lower that cost as to obtain a higher profit margin. For example, in July 2000, KBC Bank, in a joint-venture partnership with the information technology firm EDS, has become the first in Belgium (and perhaps also in Europe) to offer other banks the possibility of outsourcing the back-office aspects of their international payments business. KBC says it is already in contact with other financial institutions that may be interested in using the service, which will offer web-enabled payments.

Part of the rationale for the new venture relies on the currently high technology costs of seamless end-to-end international payments. This is causing banks to look more closely at whether their volumes of payments can generate enough profit, and whether it would not be advantageous for them to split the front- and back-office aspects of the service and hand over the latter to a specialist. Banks with high volumes, conversely, can optimize their profits by running back-office payments activities for others.

All European banks are under particular pressure to bring down the cost of international payments, especially in the euro area. Cross-border payments in the single currency are significantly more expensive than domestic payments (for which personal customers generally do not have to pay at all). Customers are increasingly frustrated by these costs to other EU entities since they undermine the benefits of the European single currency. They feel that where both legs of a payment transaction are in euros, the cost should be the same irrespective of whether it is domestic or cross-border. Unfortunately, international payments, though, involve much more human intervention within the transmitting and receiving banks and this keeps prices high. This problem is being addressed by introduction of the IBAN standard (International Bank Account Number) and the IPI standard (International Payment Instructions) developed within the European Committee for Banking Standards. It is

hoped that use of these protocols will be widespread by 2002, though their introduction involves up-front investment to achieve savings that some banks have been reluctant to make.

KBC pointed out in its announcement of this joint venture that the banking sector is being forced to act by the increased competition that has resulted from introduction of the euro and pressure from the European Commission to make international payments cheaper and more transparent for the consumer. Both the European Central Bank and the European Commission have in recent months put out papers stressing the importance they attach to this issue and to a significant lowering of costs before January 1st 2002, when euro notes and coins are introduced.

4.5.4 Agents and Cross-Selling of Banking and Insurance Products

The term 'bancassurance' encompasses all the sales of insurance products by banks. This includes business generated by banks simply acting as agents for wholly independent insurance companies. The rise of bancassurance in the last 10 years has been intimately associated with the spread of 'Universal Banking'. Universal banking occurs when one enterprise is able to provide a full range of financial services including the products of retail banks, investment banks and insurance companies. Bancassurance is already a reasonably well developed phenomenon in some European Union countries in individual long-term insurance.

Fortis, the Belgo-Dutch financial group, has been bringing its Dutch and Belgian banking activities together under the name Fortis Bank. This allows Fortis to create a leading bancassurance platform in the Benelux countries, with the highest market share in some segments.

The reason that bancassurance has excited so much attention, despite its relatively modest penetration of even most European Community insurance markets, is that it is being held up as the way in which financial firms will offer services in the future. The trend to de-regulation and development of competitive financial markets has been at its most advanced in Europe. There is strong pressure for similar reforms in other

important financial markets. A major restructuring of the global retail financial services industry would have major implications for corporate governance, employment and overall economic performance as well as individual company prospects. It is the perception that 'Universal Banking' in general and 'Bancassurance' in particular represent the future which is the current conventional wisdom as expressed, for example, in a recent study by Hoschka:

"While just about half of the largest EC banks have so far expanded into the area of insurance, it is likely that those institutions which have not entered will do so in the future. This prediction is based on two arguments: firstly, those banks which have successfully entered insurance such as TSB and Credit Agricole are frequently cited as success stories, arousing interest among other European banks which are eager to emulate these entry moves. These examples have illustrated that a successful entry strategy offers significant profit potential for banks. Secondly, competitive pressure will be such that once other banks have entered insurance, those banks which have not done so are forced to emulate the moves of their competitors in order to prevent losing market share. Bancassurance will therefore become an even more widely spread phenomenon.' (Hoschka T.C., 'Bancassurance in Europe', Saint Martin's Press, New York, 1994, p. 145.)

A further reason for the interest in links between banks and insurance companies is that joint ventures have sometimes been used as a method of entering a new insurance market. Such alliances include Banco Bilbao Vizcaya and AXA in Spain, Credit Lyonnais and Allianz in France, Banco di Napoli and Zurich in Italy and the Bank of East Asia and Aetna in Hong Kong.

Banks have sought to enter insurance markets because bank management have believed that such markets are potentially profitable. In Germany and other countries with a tradition of universal banking, banks have long been stakeholders in insurance. Elsewhere, regulatory changes from the mid 1980s onwards increasingly permitted banks to enter insurance markets. Previously banks were banned in most countries from engaging in insurance. As banks and other financial institutions look ahead they are planning to operate in a global marketplace in which the old regulatory divide between banking and insurance no longer exists. The value of a banking license is continuing to fall due to increased competition from non-bank banks, disintermediation and the internationalization of the banking industry. Moreover, income earned by traditional bank activities has fallen. In particular, spreads between borrowing and lending have diminished and the portion of bank income accounted for by interest has declined.

Banks have, therefore, been under great pressure to extend their business scope. This pressure has lead to systematic consideration of the possible use of the large branch banking networks for cross-selling non-banking financial products. In particular, these high fixed-cost retail networks with substantial direct contact with customers appear to be well suited to sell insurance products. The prospect of transforming extensive branch networks into relatively low cost, easily managed distribution channels was and is highly appealing. Furthermore, banks possess significant, high quality information on the financial circumstances and requirements of customers. This offers the opportunity for highly targeted marketing of other financial services including insurance and gives banks a significant advantage over insurance companies in that they have a large and relatively stable base of customers with whom they are in frequent contact through monthly statements. It has become increasingly important for banks to use this advantage as retail customers are becoming increasingly financially sophisticated and demand for bank deposits as a form of saving is dropping relative to saving via pensions and life insurance.

There have been two other important reasons for banks entering insurance. On the push side, a number of the other competitive strategies pursued by leading banks have yielded bad results. In particular, bank attempts to grow their assets by lending on property, led to some pretty disastrous results in the late 1980s and early 1990s, just as

lending to a number of developing countries led to disaster in the early 1980s. Acquisition, particularly cross-border acquisition, has often led to major problems. On the pull side, a number of banks who had moved into insurance during the same period did well. In particular, Predica of Credit Agricole and Lloyds Bank through Abbey Life Insurance seemed to offer good examples of profitability. Furthermore, such diversification offered the opportunity to spread and perhaps even diminish risk. Many of the core risks central to selling and underwriting life insurance - interest rate, credit, adverse selection and liquidity risks are familiar to bankers, the exceptions are mortality risk and expense risk for non-direct selling. Bankers are also familiar with the available methods for managing such risks. (Saunders A. and Walter I., *`Universal Banking in the United States'*, Oxford University Press, Oxford, 1994, ch. 6.) If it is true that banks manage assets and insurance companies manage liabilities then it is also true that many of the required skills are the same.

An important reason for banks' caution in pursuing the strategy of bancassurance is that there may be diseconomies of scope in extending banking business to insurance, particularly in IS. The proposition that economies of scope would automatically appear by extending the product range of bank branches seems flawed. The future of the bank branch itself in Belgium is under challenge, and the distribution model of other countries in bancassurance may not be transferable. For example, according to OECD (1999) data, in the traditionally organized French market bancassurers enjoy a significant advantage. In 1993, the expense ratio in France for the top 12 bancassurers was 4.5% compared to 13.7% for all other companies. This difference arose because the majority of bancassurers focus on branch based distribution which is less expensive than other channels such as employed sales forces. However, in the more competitive, innovative UK market there was no significant difference in the expense ratio between bancassurers and insurance companies. Therefore, it may be difficult to tell how this will transfer to the Belgian model of bank distribution. (OECD, 1992, p. 73.) In Belgium, projected growth in insurance markets should benefit bancassurers, since personal general insurance industry expense ratios are high. But the compensation of branches for bancassurance selling, with the mixed agent and employee schemes of Belgian banking, may be challenging. Compensation for bank employees / agents can either be on a salary basis or on a commission basis, which is more in line with insurance selling.

4.6 Mergers and Acquisitions

The banking sector is currently undergoing a thorough transformation. Not only is merger and acquisition activity reaching unprecedented levels, with almost every month bringing news of another "mega-merger", bigger than the last, but also, possibly more fundamentally – the focus of banking activity is gradually moving away from interest-earning to revenue-earning, as banks seek to become providers of a wide range of financial services to their clients. The borders between banking, insurance and securities are blurring, and may disappear completely one day.

There are two identified factors underlying this transformation. The first is new developments in technology, which make new services possible and reduce the costs of providing traditional services. The second factor is the increasing internationalization of financial services markets.

Belgium is one of the most heavily banked countries in the world. Mergers and acquisitions have been a prominent feature in the Belgian banking sector throughout the nineties, with the mergers of Kredietbank/CERA, ING/BBL, SGB/Fortis, and Fortis/Generale. But the Belgian banking sector continues to slim down in its home market, with the number of branches continuing to shrink as merged banks shed duplicate operations. At end-1995, there were 7,668 bank branches in Belgium. This had dropped to 7,129 at end-1998. However, the banks have been less successful in shedding personnel. Employment in banking at end-1998 was 76,432, compared to 76,541 at end-1995. A slight drop in teller numbers has been offset by expansion in the number of managerial staff. Interesting to note that before the banking deregulation of the mid-eighties, the competition between banks took mainly the form of a non-price competition and during that period the banks compete by increasing their number of branches. This non-price competition strategy appeared in France as well as in Spain.

4.7 Conclusion

This chapter of the research outlined both the European and Belgian banking environment during this period, and discussed the regulatory structure underpinning the competitive situation. This information was provided to give a solid background in understanding the external environment the retail banks in Belgium were facing during this period. The next chapter provides the research methodology guidelines for the two case studies in the chapters following.

Case Study Methodology

Chapter 5: Case Study Methodology

This chapter discusses the case study research methodology, including case study selection, research procedures, and consideration for interview subjects.

5.1 Research Philosophy

5.1.1 Interpretivist Approach

The case study research proposed was undertaken with an interpretivist stance, using Chua's (1986) classification of research epistemologies into positivist, interpretive and critical approaches. This approach was chosen by the researcher as it was a philosophical match with her view on the subject, as well as the fact the research was designed without formal propositions or hypothesis for the case study research.

IS research may be classified as positivist if there is evidence of formal propositions, quantifiable measures of variables, hypothesis testing, and the drawing of inferences about a phenomenon from a representative sample to a stated population (Orlikowski and Baroudi, 1991). However, since the variables in these case studies are not all quantifiable and measurable and formal propositions are not to be used, the positivist approach appears not appropriate for this research.

IS research may be classified as 'interpretive' if it is assumed that knowledge of reality is gained only through social constructions, such a language, consciousness, shared meanings, documents, tools and other artifacts. This appears to be a more accurate approach for this case study research, since interpretive research does not predefine dependent and independent variables, but, rather, focuses on the complexity of human sense making as the situation emerges (Kaplan and Maxwell, 1994). Indeed, interpretive research attempts to understand phenomena through the meanings that people assign to them (Orlikowski and Baroudi, 1991). Interpretive methods of research in IS are therefore "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1993, pp. 4-5), which adequately describes the intent of the research proposed.

Interpretivist research philosophy requires a certain set of principles for the conduct and reporting of interpretive research (Klein and Myers, 1999). In particular, it requires:

- Critical reflection of the social and historical background of the research setting, so that the intended audience can perceive how the - current - situation under investigation emerged. This process is called contextualization.
- Critical reflection on how the research materials (or "data") were socially constructed through the interaction between the researchers and participants.
- Based on the two previous critical reflections, a relation is established between the details revealed by the data interpretation and the theoretical, general concepts that describe the nature of human understanding and social action.
- Sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings ("the story which the data tell") with subsequent cycles of revision.
- Sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar, sensitivity is needed to the differences emerging from multiple witness accounts, even if all 'tell it as they saw it'.
- Sensitivity to possible 'biases' and systematic 'distortions' in the narratives collected from the participants.

All of these principles are covered within the structure of a case study research protocol, discussed below.

An interpretive orientation conceives many possible realities, each of which is relative to a specific context or frame of reference. The social agreements about the meanings of the theories provides, however, the necessary guarantee for the theories. This view has led to the development of several research programs in IS where behavioral research issues abound.

5.1.2 Hermeneutics

Hermeneutics is commonly defined as "the art or science of the interpretation of literature." As a philosophical approach to human understanding, it provides a philosophical grounding for interpretivism. Critical hermeneutics, as an integrative theoretical framework, combines both interpretive and critical elements, and addresses those social and organizational issues which are key to the successful implementation of information systems (Myers, 1994). As a mode of analysis, critical hermeneutics suggests a way of understanding textual data. In this regard, the most fundamental principle of hermeneutics may be that of the hermeneutic circle. Indeed, this principle is foundational to all interpretive work of a hermeneutic nature and is in effect a meta-principle upon which the following six principles expand.

The idea of the hermeneutic circle suggests that the researcher comes to understand a complex whole from preconceptions about the meanings of its parts and the interrelationships that flow therefrom. In a number of iterations of the hermeneutic circle, a complex whole of shared meanings emerges.

In the present case, this way of interpretation is used in applying the principle of interaction between the researchers and subjects. Again, this was not only chosen on philosophic preference, but on the practical logistics on interviewing subjects on a retrospective subject, and from several angles.

5.1.3 Methodology Issues for Interviewing

In case study research, real-time longitudinal studies are usually preferred over retrospective interviewing (Pettigrew, 1997). However, in this particular case, the detrimental issues of retrospective interviewing appeared not as strong as in other scenarios. For example, one of the problems with retrospective interviewing is that interviewees may not be able to recall the past accurately or without memory bias; remembering as they want to and not quite as it did happen. However, given these IS integration issues are still on the table as a function of the current mergers, how the subjects have handled these issues in the last five years is still relatively fresh in their minds. And, unlike in many other countries, the CIO and IS managers in these banks have held these positions, on average, for the last 10 years. Although selective memory and socially desirable answering, in terms of positioning themselves vis-à-vis the merger process, is still an issue in the validity of the interview response, the design and structure of the interview in an open, non-leading manner has tried to address some of these issues. For further discussion on the issues of retrospective interviewing, there are several references that cover this topic extensively (Leonard-Barton, 1990; Golden, 1992; and Miller, Cardinal and Glick, 1997).

Another issue of retrospective interviewing tends to be the validity of past data, and how relevant that data is currently in the eyes of the interviewee. But the data used in this research is standardized data from the BVB, which has been classified and categorized the same way since 1992.

Although retrospective interviewing has several limitations, in this case, as in many others, it is not always feasible nor possible to undertake a real-time longitudinal study. In order to accomplish these case studies, the researcher had to have several interactions with the Board of Directors of the respective banks for permission and non-disclosure issues. Actual participant-observation or extensive interviewing would not have been possible, given the merger environment.

5.2 Case Selection

5.2.1 Selection Criteria

In the overall bank industry assessment, the top seven banks during this period had the majority of the bank income (over 60%) for Belgium. Therefore, given these banks most likely had the volume and documented practices to perform research on their decision processes, the researcher focused on choosing two of these retail banks for the case selection.

This period before the mergers and consolidations was characterized by the first phase of privatization at state-owned ASLK-CGER (now part of Fortis) and reorganization efforts at most banks, aiming to increase productivity in the face of mounting demands by shareholders for better returns. Ultimately, these demands would lead to consolidation at shareholder or (hostile or other) bidder initiative into a number of groups, among them prominently Fortis (ASLK-CGER and Generale Bank), Artesia (BACOB and Paribas Belgium), BBL (acquired by ING), and AXA Bank (IPPA, part of AXA Royale Belge and ANHYP, acquired at end-1998 by Royale Belge for AXA).

Given the potential impact of the merger situation on IS efficiency, and visa-versa, the researcher felt it was best to choose two retail banks who were also experiencing the merger effects in the current time period. Inquiries were made at all of the banks above, and two of the banks, Fortis and Artesia, in the retail forms of Bacob and ASLK and GB, agree to be of assistance in the research. In terms of the other major banks, KBC and BBL both declined, due to internal restructuring efforts constricting their time for discussions, and Dexia and AXA both declined the case study, but gave an executive level interview in terms of issues and process challenges.

5.2.2. Rationale for Two Banks

The rationale for using specifically two banks for case studies is that one case study is not a comparison of best practice, but a snapshot of an industry player. Ten banks would take a great deal of time and co-operation (both of which are short in supply in today's banking industry). The theoretical reason for the two banks being used in the case studies is that they are both leading industry players in the same geographic industry, but with different backgrounds and with a wide-ranging use of IS. Given they are leading players, some possibilities of already having some best practices in this area exist, or at least can be examined.

In a comparison of the top banks in industry, initial findings found, as seen in the previous chapter, in using sum or loans and deposits as the output variable, the nondummy variable bank (ASLK) was the 'worst' of the comparison, as all of the dummy variables were positive and higher than zero coefficients, and the 'best' bank in terms of both coefficient of elasticity and in terms of significance was the bank with dummy 1 (Bacob). Therefore, although there was research relevance in the choices made for case studies, on a practical note there was also an element of luck involved in that these were the two banks that agreed to co-operate with the research.

5.3 Research Procedures

5.3.1 Overall Issues

Within the framework of the case study research, the issues of validity and reliability are addressed within the data collection, data analysis and research design aspects of the research, as to establish appropriate measures for the concepts being discussed.

The research is controlled for external variance in the research questions by choosing a single industry in which the treatment of information plays a key role in methods and procedures as well as in the products offered. The banking and financial services industry was selected as the industry from which the organizations would be chosen. Two different organizations, competing in the financial markets, will be chosen. This sampling may be described as a theoretical sampling (Strauss and Corbin, 1990) because cases are selected for study as a result of their differences. The preference for qualitative analysis also implies that the group of informants is not treated as a sample justifying quantitative inferences, but is viewed more accurately as a means to discover "true" categories.

Although the unit of analysis used in the research is the organization (which has some drawbacks as discussed in Chapter 3), various interrelated views of the organization were used: 1) the organization and its IS needs throughout the 90s, 2) the different organizational and political aspects of the relation between the organization's strategic needs and IS, and 3) the mixed relationship formed by one or more IS solutions, the organization's strategic needs, and competitive performance. In order to find satisfactory answers to the second and third research questions, senior executives who were competent in the areas of both strategy and information technology – using indepth, relatively unstructured interviews - were asked about the links between each of the selected applications, competitive performance, and the strategic use of these IS solutions.

The project covers both strategy, through the concept of competitive advantage, and information technology, through the concept of deployment/reengineering of an information technology solution. Even within a very limited number of organizations, it undoubtedly may prove difficult to document all aspects of the research model. The research contribution is, however, part of an effort to understand the interfaces between information technology applications, performance, the organization's strategic needs, and the informal aspects of management.

5.3.2 Specifics for Case Study Research

For case study research, Yin (1989) suggests three tactics to improve construct validity:

 Using multiple sources of evidence: According to Yin (1989), the use of multiple data sources can contribute to a high degree of construct validity, since "multiple sources of evidence essentially provide multiple measures of the same phenomenon." This study will utilize multiple sources, in the primary forms of interviews, and document analysis.

- 2) Having key informants review the case study report: Yin (1984, p. 139) discusses such a review: "the corrections made through this process will enhance the accuracy of the case study, hence increasing the *construct validity* of the study....In addition, where no objective truth may exist...the procedure should help to identify the various perspectives, which can then be represented in the case study report." The study will be reviewed by at least two members of the respective organizations, each holding different positions within the redesign process.
- 3) Maintaining a chain of evidence: In order to ensure construct validity and reliability, Yin (1989) recommends that a case study be constructed such that a reader or external observer would be able to trace from conclusions back to the initial research questions or from questions to the conclusions. This concern will be addressed by creating a case study protocol, outlining the procedures for the case research and documenting the entire case research procedure.

External validity pertains to the generalisability of the findings, and case studies are commonly misunderstood for a supposed lack of external validity resulting from not satisfying well-accepted "sampling logic." However, there exists the accepted rationale for the legitimate use of one critical case to test well-formulated theory. Often, a critical case can effectively confirm, challenge or extend a well-articulated theory. For this purpose, Yin (1989) suggests the use *theoretical replication logic* rather than *the literal replication logic*, which should address this issue.

Reliability is concerned with "whether the process of study is consistent, reasonably stable over time and across researchers and methods" (Miles and Huberman 1994, p. 278). Yin suggests two tactics to ensure reliability of the study: creation of the case study protocol and development of a case study database.

- Case study protocol: This protocol guides the investigator in conducting case study research in a standardized manner. The protocol for the study, created in accordance with Yin's guidelines (1989), will consist of the following documents:
 - A one-page pre-proposal outlining the objective of the study and the type of access to data required for completion of the study.
 - A broad description of the envisioned research report with chapter by chapter summaries of the proposed contents.
 - A proposal consisting of the research questions, literature review, description of the research methodology to be adopted, a brief description of case study sites, and a list of relevant readings.
 - 4. An evolving questionnaire used to guide thematic interviews.
- Development of case study database: This element will consist of the following components:
 - Case study notes primarily consisting of hand-written notes on the margins of the interview transcripts or on the questionnaires used for interviewing. These notes highlight important points that were relevant and any cross-references to other interviews referring to the same issues.
 - Case study documents include the interview questionnaires, interview transcripts, company background information and project-related documents.
 - 3. The case study narrative, which will attempt to synthesize information from all different sources and present the sequence of events that occurred in the organization with some coherence, supplemented by some additional quotations from the transcripts.

5.3.3 Case study protocol

The case study protocol has been designed to document the research process, and allowed the researcher to revisit the process in a hermeneutic circle to continually assess the understanding of the situation and the timeperiod. The questionnaire did initially evolve, as the initial respondents were CEO and Chairman of the Board level, and the respondents following were able to give more details in tactical areas, whereas the initial interviews were more strategic in nature.

The case study narrative has been useful in the dynamic of the analysis of the open systems within each bank group, specifically the period prior to the merger activity. The case study database, as it is not quite a database but a series of documents, required several attempts at organization before it became quite right -- again hermeneutics in revisiting the structure of the interviewing.

5.3.4 Semi-structured interview preparation and implementation

The semi-structured interviews in this research were designed to take, on average, one and one half hours per interviewee. The structure of the interview was a series of open-ended questions, directed towards a discussion of infrastructure, technology decision making, process decisions and measurement of use of IS in the organization. The design of the questions focused on description and explanation, as to have the interviewee verbally paint a picture of the process and surrounding issues of each subject. The interview subjects ranged from the CEO / Chairman of the Board to the IS Director, to members of the strategic committee for the merger of the IS systems of two or more consolidating bank operations. A sample questionnaire can be found in Appendix C, and a few quotes from the case studies can be seen in Appendix D.

A secondary interview structure was created for the IS vendor interviews (i.e. EMC Corporation, a storage vendor for mainframe environments), as to mirror the direction of the bank interviews, but from a supplier perspective. The secondary interviews were one way of triangulating the qualitative information available for the research.

Field procedures included:

- Clear choice of banks, which were chosen on several factors: quantitative assessment of IS as a production input, accessibility of information, willingness of the bank to participate, potential for in-depth research.
- All field observations and contacts were done solely by the doctoral researcher, Mrs. Fairchild.
- Most data was collected from either the interviews (individual or group), or documents. Documentation of the data collection occurred at each site visit.
- Data was mainly gathered at the headquarters sites of each participating bank. Additional interviews with IS vendors happen on either the vendor's offices or a neutral third party site.
- Interviews occurred at the timing and discretion of the senior management interviewees of each bank -- due to their schedules.
- Interviews were not tape recorded, by request of the bank participants. Nondisclosure agreements have been requested, and bank anonymity required.

5.3.5 Content analysis

The reason for using content analysis is that the information available from the different organizations profiled in the case studies will be unstructured, and in various formats. Content analysis gives a method to analyze the varying pieces of information in a structured framework. It also allows the research to analyze unobserved occurrences through the data associated with the occurrences, e.g. minutes of meetings without attending the meeting.

In order to analyze the 'content' of organizational document to see the affect of the IS elements on competitive advantage, the researcher needed to design a methodology including units of measure, a framework for what kinds of information is to be analyzed, and a creation of connections for analytical inference.

Given that the documents and other pieces of information are of varying lengths and forms, a logical unit of measurement is, in this case, a singular document, whether it be a memo, report, or project status sheet. Within an organization, there are several types of documents analyzed for content in this regards:

- Instructing documents: memos or other short documents asking for something to be accomplished, based on certain inputs form IS elements. This could include IS project requests or other documents of this nature.
- Recording documents: Documents designed to take a decision to the next level, whether it be a purchase, a sale, or another change of some kind, related to the IS inputs.
- Proposing documents: project proposals, purchase requests, organizational change proposals, etc. that suggests or proposes a change, based on the inputs of IS.

The framework for the analysis specifies the content to be analyzed, including name/source of the information, geographical location of the information, time frame of the information, and sampling. In order to provide a strong framework, both in terms of analysis and in terms of reliability/validity, much detailed information about how the content analysis will be performed as possible should be available.

According to the research provided in Krippendorff (1980), there are several types of inferences one may choose for the analysis. The systems approach appeared to be the best fit for this proposed case study and content analysis, as the model created by the literature review has several variable components with hypothetical linkages to be tested. A potential drawback for the analysis appears to be that the documents will only come from a limited timeframe and that the research will only occur one time, and will not be repeatable.

The analytical construct creates an inference between what the researcher knows about the interdependencies between data and context. In essence, it has been a series of if-then statements, trying to create a theoretical framework for how the independent variables represent the possible data and the dependent variables represent the inferences about the context of the data. In this case, the researcher builds a construct based on contextual experiences (with explained premises of any assumptions made) and established theories from the literature review, designed to look at how frequencies of occurrences can be used as direct indices or bases of correlation between variables.

Sampling may consist of a relevant number of project documents within the previously indicated categories, depending on the size of the project, the number of participants, and the size of the organization. If the organization does not produce many of these documents within a normal period of time, then the sample size may be small.

The recording of the data for analysis is undertaken singly by the researcher, therefore there should not be arising an issue of, among others, possible differences in coding, syntax and semantics outside of the definitions pre-set by the researcher for the recording process. Indeed, the data language set in the initial framework parameters are set by the researcher, with the researcher predefining the characteristics looked for and how they are to be categorized.

5.3.6 Triangulation of information

In terms of the information sources, particularly the retrospective interviews, there is a need for triangulation of the materials acquired, as to compensate for any potential weaknesses. The basic assumption of triangulation is that the weaknesses in each single data collection method are compensated by the counter-balancing strengths of another method (Jick, 1979). By creating a mode of inquiry to collect and double-check findings, using multiple sources and modes of evidence (Miles and Huberman, 1998), the research can build the triangulation process into the on-going data collection.

The information for the analysis comes from interviews, collected materials from the time period, and data on the IS activities of the banks in the time period from the BVB. By combining factual data, published documents and verbal interviews, the

researcher has tried to compensate for any inherent weakness in either the form of data or bias in the source of data.

Measurement error can occur in using respondents for interviews not on a random basis, but on the basis of their expertise (Philips, 1981). In order to avoid measurement error (both systematic and random error) in the interview process, the choice of interviewees ranged from board level management to tactical day-to-day IS management, to others outside of the retail segment of the bank (i.e. corporate banking, IS vendors). For more information on the triangulation of the materials, please see Appendix E.

5.4 Considerations for Interview Subjects

The use of high level executives for the case research is bounded in previous IS research in similar areas. Research on executives' perceptions of IS has appeared in a number of studies. For example, IS researchers have used subjective measures to assess the "success" of IS projects and the IS organization (Lucas 1975; DeLone and McLean 1992). However, both sets of measures are intermediate in the sense that they are expected to contribute to IS business value; they are not definitive measures of IS business value in any sense. Broadbent and Weill (1993) posit a relationship between managerial perceptions of the role of IS infrastructure, the perceived value of that infrastructure, and their IS investment biases. Research has also determined that a CEO's perceptions and attitudes towards IS and the degree of importance attributed to IS by the CEO, are strongly associated with an organization's progressive use of IS (Busch, Jarvenpaa, Tractinsky and Glick 1991; Jarvenpaa and Ives 1991).

Consistent with the studies outlined above, researchers have argued that executives are sufficiently knowledgeable to act as key informants in a qualitative assessment of IS success in their own organizations (Dess and Robinson 1984; DeLone and McLean 1992). The basis for this argument is that executives are consumers of IS from which they formulate a perception of the extent to which IS has contributed to firm performance (McLean 1979; Rockart and Flannery 1983; Davis and Olson 1985; Kraemer, Danziger, Dunkle and King 1993). Furthermore, when participating in

decisions that involve investments in IS, executives are exposed to the opinions of their subordinates and fellow business unit executives (Starbuck 1985). Taken together, these studies confirm the importance of executives' perceptions as indicators of the contribution of IS to firm performance, while providing further support for the use of perceptual data in such studies.

5.5 Conclusion

This chapter has discussed the case study research methodology, including case study selection, research procedures, and consideration for interview subjects. The following two chapters provide the details of these two case studies, and lead toward the two concluding chapters which outline the findings and future directions for research.

Case Study Methodology

Chapter 6: Case Study: Fortis

This case study introduces the IS operations and decision making processes of ASLK during the period 1994-1998, which therefore includes the Generale Bank acquisition by Fortis in 1998 and the creation of Fortis Bank. This case study describes the organizational structure, IS infrastructure, operationalisation of organization, the quantitative analysis of the bank IS spending, and a discussion on the IS impact on the organization and its competitiveness.

6.1 Introduction to The Fortis Group

The Fortis Group has more than 100 companies operating internationally in insurance, banking and investments. It was created in 1990 from the merger of the Dutch banking and insurance combination AMEV/VSB and Belgium's largest insurer, AG, in what was the first European cross-border consolidation in the financial sector. Since its inception the group has both grown internally and expanded through acquisitions, mainly in the Benelux countries and the United States. Mergers over the last five years include: the Belgian bank, ASLK-CGER, in 1993; NMKN-SNCI in 1995; the Dutch merchant bank MeesPierson in 1996; and the Belgian bank Generale Bank in the second quarter of 1998 (See Figure 6.1).


Figure 6.1: Fortis Group Balance Sheet Assets

Fortis Group provides insurance, banking and investment products and services in the Netherlands and Belgium. In the United States, it concentrates on the insurance and investment sectors. The group is active also in Spain, France, Luxembourg, the United Kingdom and Australia, and in various countries in Asia and the Caribbean. According to its public press office, Fortis, as a group, aims to get its cost-income ratio down to 55 percent in 2003/2004. For Fortis' banking operations in the Belgium, the 1998 cost/income ratio was over 66 percent, down from 1997's figure of over 70 percent in 1997.

6.1.1 Fortis Bank in Belgium

Veritable institutions in Belgium, the names CGER/ASLK and the General Bank have been disappearing. The banks continue under the banner of Fortis Bank, the name of their purchaser. Customers have some time yet to adjust, with branches having started to adopt the new label only in the spring of 2000. There will be less of them, as Fortis

Bank intends to close 800 sales points in Belgium. The news is not surprising. It results from the purchases carried out by the Belgian-Dutch Fortis group, jointly chaired by Maurice Lippens and Hans Bartelds. After a succession of takeovers, the group's banking activities seemed scattered, dispersed under various names. At first, the duo running the Fortis group, Lippens and Bartelds, did not want to rush things, Only new entities were given the joint brand name. The group believed that it could take advantage of the names of the banks and insurance companies absorbed. Since the takeover in 1998 of the General Bank, Belgium's premier bank, the strategy has completely changed. Maurice Lippens intends to make the group more clearly visible and to take advantage of the successive takeovers by merging the different institutions. The group has decided to unite and reorganize the banks in one transnational institution covering the Benelux countries. This will be Fortis Bank, employing 40,000 people and operating 3,000 branches. The operation involves a fusion on each side of the border into two distinct legal entities, but there will be just one operational management, under Herman Verwilst, chairman of the management committee. The merger will not only have a legal impact. Staff will also be affected, by changes in functions - at times by a move from one branch to another. There will also be departures, for Fortis Bank intends to lower full-time staff levels by between 4,800 and 5,300, "through natural attrition" (Trends International, 1999).

6.1.2 Pre-merger

CGER/ASLK

In 1865, the reorganization of the Belgian financial world led to the establishment of the Algemene Spaar- en Lijfrentekas (ASLK-CGER). In more recent history, in 1987 the government launched, in the framework of budgetary rounds, the first privatization proposals for ASLK. In the same year, ASLK took a participation in Fortis Bank Luxembourg (FBL, previously Banque UCL); in 1992 ASLK became the majority owner. FBL has a unique position on the Luxembourg bank scene, in particular as regards to internet banking.

In 1992, ASLK was split into two limited companies: ASLK Bank and ASLK Insurance. A cost-sharing association, without legal entity, groups the support services (those without direct commercial activity. The federal government's participation in financial institutions, among them ASLK Bank and ASLK Insurance, are grouped into ASLK Holding, which later changes its name into FPM, the Federale Participatiemaatschappij. These restructurings are the result of the realization of the single European market.

In 1993, at the request of the government, privatization of ASLK-CGER started when FPM sold 49.9% of the capital of ASLK Bank and ASLK Insurance to Fortis. In 1995 ASLK-CGER Bank took over Crédit à l'Industrie - Krediet aan de Nijverheid, a public-sector institution specializing in the provision of loans to middle-market corporate customers, which was merged with ASLK-CGER Bank two years later. Over 400 retail branches operated under this brand.

In 1997, ASLK-CGER Insurance became a 99.9% subsidiary of ASLK-CGER Bank and Fortis raised its stake in ASLK-CGER Bank to 74.86%. In the meantime ASLK-CGER Holding changed its name in Federale Participatiemaatschappij (FPM) / Société Fédérale de Participations (SFP). FPM/SFP still owns 25.1% of ASLK-CGER Bank. The remaining shares, i.e. 0.04% of the bank's capital, are held by the public at large.

Générale de Banque / Generale Bank

Following World War I and the Great Depression of 1929, a royal decree was passed in 1934 separating Société Générale de Belgique banking activities and venture capital activities. This marked the birth of Generale Bank and Société Générale de Belgique, which was for a long time the bank's main shareholder. Société Générale de Belgique still has a 19.51% participation in Fortis.

Generale Bank existed for more than 175 years and was Belgium's leading bank, with more than 1,000 branches, and an internationally known reputation.

At the time of its acquisition by Fortis, General Bank was the biggest bank in Belgium, with about 30 percent of all client deposits. The Bank had roughly 2 million clients from the general public, and approximately two-thirds of all enterprises did business with them. Approximately 60% of foreign trade of Belgium went via the Bank's international operations, and 25% of all payment traffic in and out of Belgium went through Generale Bank.

In 1993, Generale Bank adopted a Concentric Circle strategy for geographically handling its operations. The First Circle was Belgium, the Second Circle was a circle of 400 kilometers, with Brussels as its centerpoint. Within this Second Circle took place 60 percent of the Belgian export and about 50 percent of the Belgian imports. The Third Circle covered the rest of Europe, and the Fourth Circle encompassed the rest of the world.

Given that at the initial period of this timeframe (1994) no banks in the Netherlands were for sale, Generale Bank had a very expensive method of building a client base by starting a whole new bank office network. Then, in 1995, it had the chore of integrating in Credit Lyonnais Nederland (CLBN).

The actual 1998 merger of Générale de Banque into Fortis took a great deal of persuasion. In May, 1998, the board of Générale de Banque voted unanimously to back a merger with Fortis. Eight days previously only nine directors of the bank voted for the deal. The change of mind was due to energetic lobbying by Fortis and pressure by the bank's main shareholder, Société Générale de Belgique, and its parent Suez Lyonnaise des Eaux. Générale de Banque was assured that it would be able to retain its identity and would be the 'parent' of Fortis' banking interests; these included CGER-ASLK, and MeesPierson and VSB in The Netherlands (Acquisitions Monthly, 1998).

6.1.3 Post-merger

Fortis is an international group operating in the fields of insurance, banking and investment. In its home market, the Benelux, Fortis is one of the largest financial services providers, offering a broad range of financial services through various

distribution channels. In other countries of Europe, the United States and Asia, Fortis focuses on specialist market sectors. At year-end 1997 Fortis had assets in excess of EUR 298 billion (USD 328 billion) and total revenue for the year amounted to EUR 33 billion (USD 37) billion).

Fortis' Belgian banking operations consist principally of Generale Bank, Belgium's largest bank, acquired in June 1998, and ASLK-CGER Bank, Belgium's fifth largest bank, in each case measured in terms of total assets as of December 31, 1997. Following the business combination with Generale Bank, Fortis is in the process of integrating all its banking activities into one banking group, Fortis Bank, which will be organized around five business lines: individuals, self-employed and small enterprises; medium-sized and large enterprises and public sector; private banking; asset management; and investment banking and financial markets.

Fortis intends to seek further expansion, developing its strong Benelux platform, on a selective basis, into a European one, while also building a more significant presence, particularly in the US and Asia. In its other markets, Fortis intends to focus on selective customer segments, product lines and distribution channels.

The Fortis Bank image the bank wants portrayed is that of a bank with a cross-border organization. A bank that has established its headquarters throughout Benelux, directing its business from Brussels, Amsterdam, Rotterdam or Luxembourg as the need arises. This cross-border organization also focuses squarely on the customer. It revolves around eight business lines, each of which groups together activities designed for customers with similar needs and using specific products and services.

6.2 Structure

6.2.1 Mission

ASLK and Generale Bank, together as Fortis Bank in Belgium, are targeting a full range of clients. In the Benelux, Fortis intends to position itself as a leading provider of integrated financial services, offering retail, corporate and institutional clients a full range of insurance, banking and investment products through a variety of distribution channels. The eight lines of business include:

Three business lines focus on specific customer segments:

- Individuals, Professionals and Small Enterprises
- Medium-sized Enterprises and Corporates
- Private banking.

Five focus on a specific activity:

- asset management
- investment banking
- financial markets
- information banking
- financial institutions & banks.

Within the retail business segment, services available to consumers are delivery via bank branches, PC banking, and telephone banking.

6.2.2 Organigram - Management

The board of directors of the new Fortis Bank has 24 members. Alongside Chairman Anton van Rossum, and the 12 management committee members, it includes: Christian Basecq, Kerry Clayton, Jozef De Mey, Joop Feilzer, Jan Meyer, Gilbert Mittler, Kees Rutten, Georges Valckenaere, Co van Angelen, Robert van der Meer

and Michel van Pée. Outside of the management committee members, discussed below, the others have a background either from Fortis, ASLK, or insurance -- none of the directors not on the management committee have worked before at Generale Bank.

The Fortis Bank management committee mentioned above includes the chairman, Herman Verwilst, together with Jean-Pierre Cardinael, Karel De Boeck, Filip Dierckx, Patrick Evrard, Chris van Boetzelaer, Rosa Van Elegem, Jean-Jacques Verdickt, Alain Georges and Sjoerd van Keulen. Out of these, people who have a Generale Bank background are from the legal, international, and central planning functions. People who have come from ASLK are from the marketing and retail, IS, insurance and central management functions. The others come from either Fortis or other bank backgrounds.

6.2.3 Organigram - Metiers

Post-merger, as of 23 June 1999, the organization of Fortis Bank looks like this:





6.2.4 Organigram - IS

Post-merger, the head of the IS function, considered a support function for the Bank, is J.P. Cardinael. He was appointed Managing Director (responsible for Human Resources, Logistics and IS) at CGER Bank in 1993. He has been with the CGER bank since 1973.

The organigram for IS for Fortis Bank in Belgium, post-merger, looks like this: Figure 6.3 Fortis Bank IS Organigram



For Fortis Bank Belgium, Information Services (IS) defines and develops the information systems that make it possible to offer competitive financial products to clients (Partners Special Edition, 1999). IS plays an essential role in the integration and in the realization of synergies planned by the Métiers which presumes an intense cooperation between Information Services and the Métiers. This cooperation is based on the following principals:

 Different 'Domains', i.e. logical subdivision of the banking activity have been defined, e.g. account systems, payments, non-brick banking, etc.

- For each Domain, an IS Domain Manager is appointed
- For each Métier, at least one Business Information Manager (BIM) is appointed. The BIM represents his business towards the IS respondents, i.e. one or more IS Domain Managers depending on the needs of the Métier.
- For each Domain, a Domain Steering Committee is formed with the corresponding Domain Managers and BIMS. The Domain Steering Committee plays a key role in the orientation of the IS strategy of the Domain.

The organization chart above is for Belgium -- a mirror organization exists for Fortis Bank Nederland: both organizations are under the responsibility of J.P. Cardinael. The IS philosophy is identical in both Fortis Bank Belgium and in Fortis Bank Nederland; one of the objectives of this structure is to prevent the development of incompatible programs. Under J.P. Cardinael's role is also included the Facilities Management function for both countries, security and safety for both countries, and an group called Organization, which handles central organization and special issues such as Y2K/Euro, as in the Euro 2002 conversion. The mission of the Central Organization covers three domains: process management, project management, and knowledge management, all as defined below:

- Process Management: Aims at developing a global model for company processes, putting in place a global service level management (SLM) and functionally steering process managers in the business lines.
- Project Management: Aims at supplying personnel resources from Organization to transversal integration projects and improvement projects that pursue the above mentioned objectives.
- Knowledge Management: Centralizes all initiatives regarding the exploitations of lessons learned and acquired experiences. It also includes the (re)definition of the training of process and project managers, the definition and distribution of

common terminology, methodology and tools, and, in the area of the Intranet, the coordination between the information users and information suppliers of the different business lines.

The organizational charts show per Métier, the member of the management committee for that unit is in charge, with the executives answerable to him in hierarchical terms. The integration within the Fortis units for commercial banking and international banking has been faster than the integration of the units for credit and IPS; mainly because of more integration is required for the later units due to the number of premerger institutions involved.

6.2.5 Pre-merger organigrams

ASLK

Given ASLK joined Fortis in 1993, its organigram prior to the merger with Generale Bank into the Fortis Bank is of a similar nature to the current Fortis Bank model. In 1994, there was both a Board of Directors (Raad van Bestuur) and Management Committee (Directiecomite), with members who are now on the Fortis senior management. IS was considered a support function, headed up by Ludwig Jachowicz, under the financial direction management member who also controlled the retail and insurance activities. There were four business units: General Management, Financial Direction, and the two lines of business.

In 1995, there was a slight readjustment, which created a Resources unit, including informatica, human resources, and facilities management. The unit was headed by J.P. Cardinael, who was on the management committee. Other lines of business (units) were operations, credit, central management, financial markets and corporate, and marketing and retail distribution. Herman Verwilst was the director of the management committee for ASLK Bank n.v.

In 1996, ASLK-CGER Services esv was created, to provide resources for both the Bank, the insurance business, and Fortis Investment Belgium n.v. Informatica was included under this umbrella, and was called IVC. From 1 January 1997, this also included providing service for Krediet aan de Nijverhied nv, a new Fortis acquisition.

IVC, as a service organization, was designed to serve both the internal clients, the system infrastructure, and service to end customer. Internal clients were served via direction from the Steering committee, systems infrastructure was served via project management priorities, and the end customers were served via a diverse product program, which included many delivery forms, such as Teles, phone banking, and branch banks.

A internal book was published yearly on the structure of ASLK-CGER Services ESV, with the 1998 edition at approximately 2 cm thick. This reference document outlined strategy, infrastructure, projects, service profile in terms of availability of resources, etc.

Generale Bank

Prior to its merger into the Fortis Group, Generale Bank had a similar approach to ASLK for its organizational structure. Generale Bank had its Board of Directors and its Management Committee, with members taking responsibility for different business domains. There were different domains for retail and commercial businesses. For IS, Jean-Jacques Verdickt was the board member in charge of information systems, with Jacques Godet heading up the information systems unit. IS was a support function and was centralized, with an IS relationship to each business domain, as well as a head of system operations. Similar to the ASLK structure, Generale Bank had been fairly structurally stable for several years. There was roughly one-third of the IS staff that were external contractors (outsourcing). Approximately one half of the IS budget was earmarked for development work.

In terms of a description of the IS strategy and budgetary plan, this was traditionally published internally on two pieces of Excel spreadsheet. Post-merger, this information was no longer available, but the people who created it were interviewed as part of the case study. It was not a formal document, and most of the communication of IS

strategy was oral. But for the 10 years prior to the merger, the IS unit came in under budget. The budget was structured by category of cost (i.e. systems versus business applications).

6.3 Infrastructure

From an IS perspective, both banks prior to the merger had similar IS organization, and in many cases, similar IS technology. Both had mirror organizations set-up to focus on the application development for the business Métier, with a business champion to be the pointman for the business unit issues. However, how decisions were made within the infrastructure differed, as did the level of documentation of the decision making process.

6.3.1. ASLK

The IS infrastructure of ASLK, from 1994 to 1998, was focused around networks, centralized IS resources (i.e. mainframes), application development and office automation (i.e. document management, image processing). The predominant technology has been IBM-based, with use of IMS, Cobol and DB/2 in terms of application development. The acquisition of Krediet aan de Nijverheid (KN) in 1995, which was based around the Siemens Nixdorf BS2000 platform, was a migration issue to the IBM platform of ASLK for 18 months, including for credit and investment applications, which ended in November 1997. There was not a high usage of external consultants (outsourcing) during this period, and approximately 10% of the total bank personnel were in the IS department. Figure 6.4 provides an overview of both the bank and insurance IS structure of ASLK prior to the Generale Bank merger.



Figure 6.4: ASLK IS Infrastructural Coverage in Relation to the Organization

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Decision making, according to all ASLK respondents interviewed, was a well-defined process that had evolved over a ten year period. It involved annual budgeting, scoring of projects, resource allocation, and prioritization. During the period of privatization, the emphasis was on cost as a priority. In this cost culture, return on investment (ROI) was the major measurement, with a 2-3 year timeframe being the benchmark.. The company goals was 16% return on equity (ROE) in a four year framework. In 1997, the ROE for ASLK was slightly over 13%.

According to respondents, business decisions were made on the basis of core versus non-core business, driven by both business need and IS abilities.

6.3.2 Generale Bank

The IS organization of Generale Bank was focused strongly on systems and applications development, and was also IBM-based. There was a greater reliance on external consultants, with roughly 1/3 being external personnel, and with a more common platform structure across the organization than ASLK had, using an integrated business model. The business decision process was also similar in its focus on cost, but decisions were made between the business units and IS in a less structured approach. But the business units themselves measured their own technology usage as a function of the budget. Generale Bank, like a few other banks in Belgium, utilized a 1995 Gartner Group benchmark on Belgian bank productivity which showed IS expenditure divided by net bank income as a performance indicator. This benchmark provided different performance percentages for each business segment, as well as provided an overall business average to achieve.

Example of Gartner Data (source: Dexia)

Line of Business	IS exp / net bank income
Public sector banking	5%
Small and medium business (retail)	7%
Finance (i.e. dealing rooms)	15-16%
Private Banking	16%

Overall Average: 7.27%

There have been problems reported from several banks using this performance benchmark, mainly from the fact that the line of business categories are not welldefined, therefore the difference between what constitutes a high-end retail client versus a private bank client is unclear.

6.3.3 Fortis Bank - Post-merger

Infrastructure has played a major role in the post-merger IS organization, and a number of the business decisions made in the merger process. As a Generale Bank member of the strategy team involved in the IS decisions of the merger discussed in his interview, the process of deciding which technology was taken on board 'looked at overall structure and fit', matching line of businesses to appropriateness of solution. The ASLK retail IS operations were considered more cost/effective given they had already made the bancassurance investment, the Generale Bank lines of business were mixed in terms of their cost effective weighting for the merger, depending on the line of business, and the Fortis operations were considered optimal for the international operations. The ultimate decision making issue for the retail operations was the integration of bancassurance into the retail bank components -- ASLK had already addressed this in their IS infrastructure (see Figure 6.4), but Generale Bank had not, so the retail IS operations of ASLK became the default.

Generale Bank brought 400 applications to the merger, and ASLK had 300 applications. Out of all that, there was only 10 process switches that actually occurred,

demonstrating there was only a limited overlap between the organizational processes, or that there was a obviously best practice approach from one or the other party. Politics may have also played a part, although there is no objective measurement of this.

There was a nine stage delivery process developed for the merger, and as of spring 2000, the Bank was at stage four. The deadline for integration, given the Euro issues of early 2002, is mid-2001. The current deadline is 17 September 2001.

6.4 Operationalisation of organization

This particular case study, although focused on ASLK and its change into Fortis Bank, had to include information on KN and on Generale Bank because of the 1998 acquisition and the merger of the two entities into Fortis Bank.

6.4.1 IS Processes

From both the documentation and the interviews, it appears that the actual retail business processes change issue was the integration of banking and insurance into the retail environment. From an IS perspective, this involved several changes in processes, mainly to support the necessary infrastructure. The changes in the 1997 timeframe to integration and migrate the applications of KN into the ASLK IS architecture were well-documented in the written information. The changes that occurred in the late 1998 period were not available, due to the sensitivity of the larger Generale Bank merger.

6.4.2 Knowledge Management

The human resources policy of the various Fortis companies is implemented to a major extent on a decentralized basis. The focus at group level is on the exchange of know-how and experience, management development for current and potential senior

managers, and the development of principles for international human resources policy. The corporate strategy is the starting point for the cross-border exchange of know-how and experience. Firstly, the various business units can benefit from each other's functional expertise and best practices. Secondly, they can really get to know the other parts of the company. This is necessary, because it is precisely at the points of overlap that interesting opportunities for new activities can be found. The program called Accelerated Learning for Fortis Advantage (ALFA) is a good example of the intended approach. The program facilitates the exchange of internal expertise in specific fields and aims to create platforms for worldwide networks that contribute to the unity of Fortis. There were two ALFA conferences on marketing in 1999, which were attended by senior Fortis managers from both the banking and insurance arms, and a series of ALFA conferences on IS and business strategy is scheduled for 2000. There will be a virtual follow-up to the conferences on the Fortis intranet, further enhancing the cross-border exchange of knowledge and creating 'Communities of Practice'.

An international enterprise like Fortis has a large number of positions in which potential senior managers can demonstrate their talents. It is important, however, to accurately chart the required competencies and to monitor the development of current and potential senior managers. To this end, in the year under review a completely new approach was developed for the first two layers of Fortis Insurance and Fortis Bank. The starting point is that the development of managerial skills should go hand in hand with the expansion of professional know-how and experience, so as to enable managers to maintain quality as they continue to function in a rapidly changing environment. When transferring managers to other positions within the company, Fortis not only takes into account their personal development as managers; just as important is that their professional know-how is deployed in an effective manner and that the strategic cooperation between Fortis units is further developed.

Under its international human resources policy, Fortis is working on building both its corporate identity and employee commitment. To strengthen employee loyalty, Fortis decided in 1999 to extend the Stock Option Plan, previously available

in the Netherlands only, to all employees in Belgium and Luxembourg and to numerous Fortis employees elsewhere in Europe. The Career Guidance Center has been operational in the Netherlands since 1 September 1999. The center advises Fortis employees who are seeking a different position within the company. In the first year of operations, more than half of the employees who completed an entire orientation phase at the center actually applied for a different position within the company. Fortis is investigating whether the formula of the Career Guidance Center could be successfully applied in Belgium.

The Fortis Employee Orientation Program has been developed to introduce both old and new employees to the various parts of Fortis. The program provides a framework on which the local organizations can base their own introductory programs. Now that Generale Bank has become part of Fortis Bank, its European Works Council was disbanded at the end of June 2000. Steps were already taken in 1999 to set up a single new Works Council for Fortis in consultation with the European Works Council of Fortis and the relevant directors. In Belgium consultation with representatives of the companies involved has resulted in a social consultation model for Fortis Bank in which general norms are discussed and agreed at a central level and details are specified at a local level, where the local problems are also solved. In the Netherlands elections for a new Works Council have already been held at Fortis Bank, and consultation with the trade unions has resulted in an agreement on harmonization of the terms of employment of the banks involved. Because it was decided at the same time to introduce a separate collective agreement for Fortis in the Netherlands, the agreement will be extended further in that context.

6.5 Description of Quantitative Data and Discussion

ASLK	1994	1995	1996	1997	1
IS Labor	3.73%	4.00%	3.95%	4.17%	4.3
IS Capital	6.47%	7.32%	3.85%	3.31%	3.5
Non-IS Labor	67.84%	70.90%	44.48%	42.19%	41.0

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Non-IS Capital	21.96%	17.78%	47.72%	50.32%	51.10%
Total Cost	100.00%	100.00%	100.00%	100.00%	100.00%
Change in number of offices - Base year	0.00	-0.02	-0.04	0.26	0.26
1994					
IS Cost as a percentage of total cost	10.20%	11.32%	7.80%	7.49%	7.82%
IS Cost as a percentage of net bank	0.73%	0.54%	0.69%	0.75%	NA
income					
IS Cost as a percentage of total	NA	NA	4.80%	4.24%	4.63%
bankproduct					

Figure 6.5 Graph of Cost Segments 1994-1998



Regression	Coefficients
Analysis	
Intercept	2.905537
LNC	-0.43865
LNK	-0.01959
LN S	0.142166
LN L	1.659065

6.5.1 ASLK Discussion

The regression analysis data, above, relates to the sum of loans and deposits as the output, given it provided a positive correlation, as previously discussed in Chapter 3. As seen from the regression analysis, the labor inputs, both IS and non-IS, had a

positive relationship to the profitability output. In comparison to other top seven Belgian banks, for the ratios of IS cost to both total cost and bankproduct, ASLK has had one of the lowest percentages during this period. Both of these statements can be correlated to the fact that ASLK during this period had an extensive branch network, which could have caused the disproportionate non-IS spending and impacted the individual contribution of labor costs per head.

The jump in the 1996 data is likely caused by the changed relationship with the insurance business impacting the figures.

Generale Bank	1994	1995	1996	1997	1998
IS Labor	3.41%	3.45%	5.75%	6.20%	5.97%
IS Capital	7.48%	8.25%	4.55%	5.01%	5.92%
Non-IS Labor	65.11%	65.56%	62.72%	60.30%	59.97%
Non-IS Capital	24.00%	22.74%	26.97%	28.49%	28.14%

Total Cost	100.00%	100.00%	100.00%	100.00%	100.00%
Change in number of offices - Base	0	0	0	-0.03	-0.03
year 1994					
IS Cost as a percentage of total cost	10.89%	11.70%	10.31%	11.21%	11.86%
IS Cost as a percentage of net bank	NA	NA	59.85%	65.67%	73.96%
income					
IS Cost as a percentage of total	NA	NA	6.16%	7.36%	8.73%
bankproduct					

Regression	Coefficients
Analysis	
Intercept	-15.1682
LNC	-0.77093
LN K	0.810154
LNS	-0.90205
LN L	6.500697

6.5.2 Generale Bank (GB) Discussion

In the regression analysis data, above, where the output was the sum of loans and deposits, both IS inputs, capital [C] and labor [S], had a lesser relationship to the output than the non-IS inputs, especially labor. This is probably due to the continued building of retail branch networks during this period.

During the initial period examined, the bank had announced a five year Systems Plan, earmarked for BF 850 million and started in 1993 with the big push of the plan happening in 1995 expenditure. Therefore, the bank had a great deal of spending on systems planning -- too much by their own account. Besides the upgrading of the branches in terms of terminals and graphics software, there was approximately 17% of staff that were external consultants and, in terms of output, were considered too expensive after the fact. According to interviewees, Kredietbank also had the same problem during this period with outsourcing.

6.6 Table of OS elements, and discussion on IS impact on OS and competitiveness

Table 6	1.	os	Elements	for	ASLK
Table	.1.	00	Elements	101	AOLA

Main Element	Component	Description
nputs (or resources)	Financial Assets	With the capital strength of the new institution
	Capital Assets	(a Tier 1 ratio of approximately 7%) and its
		market share, Fortis Bank is a significant force
		in Belgium with a strong financial platform. The
		bank will have a noticeable presence in the res
		of the Benelux region, enabling the bank to play
		an important role in the new Euroland
		Additionally Fortis Bank will receive the
		support of Fortis, with all the resources that this
		institution can offer: this should aid furthe
		expansion in Euroland in the luture.
		ASLK-CGER was currently Belgium's fifth
	Distribution	largest bank, second insurance company and
	Network	leading bancassurance player.
		Retail offices:
		<u>1994</u> <u>1998</u>
		ASLK 1,188 1,491
		In the retail market, ASLK-CGER had about
		1,100 'bancassurance' branches and over 400
		'assurfinance' branches operating under the
		Crédit à l'Industrie - Krediet aan de Nijverheid
		brand. ASLK-CGER likewise offers an
		exhaustive range of banking and insurance
		products and services to corporate customers. I
		has been also active in the money and capital
		markets.

Case Study - Fortis

	Employees	Full time employees:
		<u>1994</u> <u>1998</u>
		ASLK 8,026 9,306
		In June 1999 ASLK-CGER and Generale Bank, the Belgian-based banking groups of Fortis, and Fortis Bank Nederland, which includes MeesPierson and VSB Bank, were merged into Fortis Bank. With a workforce of over 40,000 Fortis Bank will have 3,000 branches and seven million customers in the Benelux countries,
		making it market leader in the SMEs, private banking and asset management markets.
		In July 1998, In July the Banque de la Poste/Postbank, a 50/50 joint venture between Generale Bank and the Belgian Post Office, was entrusted with the management of 930,000 post office accounts with assets of BEF 70 billion. Fortis Bank now has the Generale Bank part of the deal.
Dutputs	Product/service mix	ASLK-CGER Bank had a leading position as an arranger of treasury paper programs for the public sector and other customers. It also continues to be the leading financier of the Flemish Region and the principal financial partner of Belgium's National social security service.
	Reputation /	
	Ratings	S&P Rating as of June 1999: ASLK-CGER Bank A Generale Bank No Rating
		Fitch - carly 1999
		Generale Bank's (GB) Long-term rating of 'AA'

Case Study - Fortis

		ASLK Long-term of 'AA-'
		1999: THOMSON FINANCIAL BANKWATCH has assigned a new Senior Debt Rating of AA- to Fortis Bank.
	ROE / ROA	In 1997, the ROE for ASLK was slightly over 13%. The overall Fortis figure for ROE was over 16%. General Bank had met its goal of a minimum ROE of 12.5% throughout this period. Both were healthy in comparison to the industry average.
Technology L	Level of Automation: Internal versus External	Externally, in 1998, Fortis banking group's nearly seven million customers had access to a network of approximately 3,000 branches. In addition to this branch network, direct banking services were used in 1998 by nearly one million customers, to transmit orders for financial transactions by telephone or to ask advice from a call center. That is an increase of almost 20% compared to 1997. Some 2% of the banking group's customers transacted banking business via their PCs or via the Internet. ASLK also introduced the SERVITEL multimedia kiosk in 1996 for services such as film tickets, and other client services.
		Internally was another matter. ASLK came from very far, given a public sector background, according to interviewees. However, level of automation internally can be viewed by the personnel supporting the automation efforts. According to company internal BVB survey figures, the amount of IS personnel investment in specifically internal processes (internal

education, computer audit, administration) was approximately 6.0% of total IS personnel spending in 1994. In 1996, the terminology changed in the BVB survey, lumping internal and external support processes not directly related to operations or development into one category. If recalculated to this 1996 terminology, support functions were 19.76% of total IS personnel spending, increasing to 19.91% in 1998, based on slight growth in the development and operational personnel area. Again, the difference in calculation was really in MIS functions, and shows little increase in training or administration, given that the level in internal automation, according to interviewees, was in need of assistance.

In terms of internal processes, a possible measure of automation is the increase in software purchasing investment (as opposed to software development) to automate processes such as word processing, e-mail and messaging, and other forms of standardized data entry. In 1994, 1.1% of total IS cost was software purchasing, staying roughly the same as 1.1% in 1998. The top five banks for 1998 was 4.73%.

Going through the ASLK documentation of 1997, one explanation for this comparably reduced software purchasing may be that ASLK was mainframe centric, and spent more on centralized software and network connections. The branches were based on Windows NT towards the end of the period, but even then had a lot of 3270 terminals through 1997, meaning IBM mainframe connections and less

Environment

Task

Environment

conditions

organization physical surroundings

loca	lized	software.
inca	in cu	Southard.

The amount spent of software rental and software customization during this period confirms this explanation. Over 54% of software expenditure in 1998 was outside assistance for customization.

ASLK, with its civil service background, has a hierarchical approach, well defined and articulated in policy and procedure manuals for all to follow.

Tasks are well-defined and procedures for each are articulated. At retail level, branches have their hierarchy, supervised by an inspectorate cadre and regional headquarters, which have limited and delegated powers from HQ. Proper paperwork and signature authority are stressed. Client approaches are not yet fully taken into account as it takes an effort to shake up a civil service mentality. A certain dichotomy exists in the ranks as the timeserving employees are civil servants with a relatively protected status (e.g. as regards dismissal or transfer), on their way to being pensioned off or absorbed into the more and more incoming 'contractuals' who have a private sector white collar employee status.

Ownership in the period under review was already partly in private towards fully in private hands.

External Links

Ownership

General

Environment

 Expansion possibilities The new owner rapidly takes charge and moves a relatively sleepy bank into faster gear towards an all round, all service bank at both retail and commercial levels.

Case Study - Fortis

Goals and strategies	Goals	Initially, ASLK focused on the public sector and still does today, but in the early portion of this
	Objectives	timeframe, they were a public entity and their goals and objectives were structured as such.
	Strategy	Their plans and strategy were also impacted by the change of ownership, specifically in the
	Plans	areas of expansion and quality/delivery of products and services. Now the target market goes beyond the public sector to the SME and corporate client, with enhanced services and additional resources in terms of Fortis and its products.
Behavior and	Patterns of	During this period, leading up to Fortis Bank
processes	decision making	creation, the patterns of decision making as assessed from the documentation and from the discussion were formal and highly structured. Influence and power relations played a sizeable role in the decision making process, and the leadership was limited to top executives, including areas of decisions on credit and policy formulation, with little delegated discretionary authority and what authority that was delegated was highly structured through policy and procedure manuals.
	Strategy	Whereas CGER/ASLK has had a culture of joint
	Formulation	management and a generous level of representation granted to trade unions, Générale
	Conflict	de Banque/Generale Bank was seen as having a
	Resolution	culture of "guerrilla warfare" and a low level of representation granted to the union federations. With the merger, the unions thus feared a "downward harmonization" in the wake of the merger to the level of the culture prevailing at Générale de Banque/Generale Bank.

Case Study - Fortis

Strength of unions	As well, in terms of unions, the two banks came		
/other	under the sphere of competence of two		
organizations	different joint committees - as a semi-public		
	company, CGER/ASLK came under the joint		
Employee	committee competent for public credit		
involvement in	institutions (No. 325), while, as a private		
process making	concern, Générale de Banque/Generale Bank		
	came under the committee competent for private		
	credit institutions (No. 310); and in addition to		
	having different statuses, employees in the two		
	banks were represented by different union		
	federations.		
	Officially, the major intersectoral confederations		
	are the only union organizations entitled to		
	present lists of candidates for social elections -		
	the Confederation of Christian Trade Unions		
	(Confédération des Syndicats		
	Chrétiens/Algemeen Christelijk Vakverbond,		
	CSC/ACV), the Belgian General Federation of		
	Labor (Fédération Générale du Travail de		
	Belgique/Algemeen Belgisch Vakverbond,		
	FGTB/ABVV) and the Federation of Liberal		
	Trade Unions of Belgium (Centrale Générale		
	des Syndicaux Libéraux de Belgique/Algemene		
	Centrale der Liberale Vakbonden van		
	België, CGSLB/ACLVB). In practice, however,		
	they devolve this prerogative to their sectoral		
	organizations. As CGER/ASLK came under		
	joint committee No. 325 until		
	December 1999, its employees were represented		
	by the public sector unions - the General		
	Federation of Public Services (Centrale		
	Générale des Services Publics/Algemene		
	Centrale van de Openbare Diensten,		
	CGSP/ACOD, affiliated to FGTB/ABVV) and		

the Christian Federation of Public Service Employees (Centrale Chrétienne des Services Publics/Christelijke Centrale van de Openbare Diensten, CCSP/CCOD, affiliated to CSC/ACV) (CGSLB/ACLVB is not organized along sectoral lines). The public service federations were naturally reluctant to hand over some of their competencies to their private sector counterparts. To avoid feuds between unions arising from the current hazy definition of spheres of competence, which would be particularly harmful at a time of social elections, the unions have obtained an undertaking from Fortis that such elections will not be organized for the 2001-4 term of office. This derogation from the royal decree that imposes social elections was sanctioned by the Employment Inspectorate of the Ministry of Employment and Labor.

Mr. Patrick Evrard, Member of the Board of Directors of the ASLK-CGER Bank, recalled the discussion that the special responsibility of savings banks in ensuring that their customers are well informed about the euro and feel confident about the new currency. The increased competition brought by the euro can be faced by savings banks mainly through excellent and transparent communication; the traditional local approach of savings banks and their proximity to the consumers, their customers could be an advantage in order to provide them with the most "personal" changeover scenario. This has been the communication style approach of ASLK, at least officially.

Communication styles

Case Study - Fortis

Culture	Symbols of	Fortis is now an established brand, at least for
	organizational	investors, and is in the course of a corporate
	identity	branding exercise that is an attempt to combine
		its locally-trusted business names in the US, UK
		and elsewhere with the Fortis name.
	Investment in Art	Like other banks in Belgium both ASLK and Generale Bank were invested in art, with the ASLK taste in art reflecting more of a mainstream modern art buying pattern.
	Physical	Physical environments are often reflective of the
	appearance of	ASLK heritage, while the HQ at the
	corporate office,	Wolvengracht reflects both the State Caisse
	branches	Generale d'Epargne et de Retraite and, in its new
		extension, its future as a all-round bank.
	Linouistic Culture	Not only was ASIK fairly Flemish and with a
	Enguistic Culture	public sector mentality, but was structured with
		visible hierarchies and methodologies. Generale
		Bank was considered by many in the industry as
		the 'old boys network' bank with Franconhone
		well-heeled sons of good families getting work
		there. Therefore the changes of integrating the
		two banks into Fortis a Dutch organization has
		been quite an undertaking.
	Style of work /	Fortis Bank faces challenges about to integrate
	hierarchy	all of the individual banks Management's
	merateny	forecast of completing the integration process by
		2002 looks completing the integration process by
		2003 looks somewhat optimistic given that the
		social environment (read: unions) in Belgium
		makes it extremely difficult to reduce staff
		levels without resorting to costly early
		retirement programs. An additional factor, one
		that is common for all merger/acquisitions, is the

issue of combining two different linguistic and business cultures, formal versus informal.

Basis for grouping	Retail bank operations were grouped into
of metiers /	horizontal bank functions: credit, electronic
Distribution of	banking, universal banking etc. The number of
metiers	IS personnel was relatively evenly spread amongst the different functions, with growth in the number of staffers correlated with the growth of the business.
Spans of control	
	The span of control went across the four areas of marketing, agent distribution, administration and
	finance. The IS function ran across all areas with
	both horizontal and vertical functions.
Structural changes	During the period under review, retail operations were not substantially affected until 1998 as the
during period	Generale Bank organization did not get merged until that time. The integration of KN was not a
	major change, as their retail processes were relatively similar to ASLK.
	Basis for grouping of metiers / Distribution of metiers Spans of control Structural changes of retail operations during period

NB: Belgian bank ratings

S&P Rating as of June 1999 ASLK-CGER Bank A Generale Bank -NR-BBL -NR-BACOB Bank S.C. A Credit Communal de Belgique AA+ KBC 'A+'

6.7 Conclusion

During this period, ASLK organizationally went from a public sector financial institution, providing both banking and insurance offerings, through privatization to become part of a combined retail offering covering a wider range of clientele for a multinational financial conglomerate. But through the period until 1998, the majority of the organizational and procedural changes were driven by external market conditions. From an IS point of view, the structural changes were made to better support the business units in line with possible outsourcing of resources for applications where needed. Most of the internal structural components of ASLK, Generale Bank, and today's Fortis Bank are very similar, with business units and a horizontal support/resources function.

The ownership of the different entities had some baring on the decisions made during this period, prior to the overall merger in 1998. When ASLK initially in its privatization process in 1994, the public sector approach to decision making was part of the ASLK business culture. There was hierarchy, strong amounts of documentation, and power structures built into the organization. IS infrastructure echoed the organization, and the adjustment in 1995 to a more resource oriented mode of operation echoes the external business environment at the time, with outsourcing companies such as EDS making in roads into other banks in industry. And as stated in section 6.3.3, IS infrastructure has played a major role in the post-merger IS organization, and a number of the business decisions made in the merger process.

From a process integration point of view, the integration of first Krediet aan de Nijverheid (KN), and then Generale Bank's retail operations into what is now the Fortis Bank meant that ASLK had to review its retail branch procedures on more than one occasion. Procedurally, the documentation of that time for ASLK shows a structured approach to project and change management.

In terms of financial growth, ASLK increased its ROE from over 8 percent in 1994 to over 13 percent in 1997, prior to the integration into Fortis Bank. Fortis as a Group in 1999 had an ROE of over 18 percent, including insurance and other activities besides

banking. The growth of ASLK during this period was not just in number of branches in 1997 from the KN merger, but in overall personnel. Both overall labor and IS labor costs went up during this acquisition. The impact of this initial KN integration was on the labor component of IS cost, as the overall percentage of IS cost as a function of total cost decreased, but the IS labor component of total IS cost increased significantly. One can conclude, therefore, that the integration of KN, who was also mainframe based, but Siemens instead of IBM, into ASLK in 1997 may not have increased the IS capital investment spending, but created more integration work for the IS department. This period of time was also when ASLK Services was created, probably adding additional IS labor expense in coordination efforts.

Structurally, the IS department of ASLK changed from a technical support group into a IS service provider for the organization, adding help services, project management groups, more vertical alignment, and other offerings designed to keep them in-line with both IS and banking industry developments. The period March 1996-October 1997 was the integration of KN and its systems into the ASLK IS organization, a process in which the change-over was well-documented.

Decision making for IS, and the changes in IS that are related to changes in organization, have been made with a drive for cost-efficiency and for lowering of personnel cost.

In conclusion, in this banking environment, strategic stakes, such as the one by Fortis, can lose their relevance over time as the markets shift, but historic shareholdings can be used for financial engineering, as in the Generale Bank example.

The next chapter introduces the other bank case study, and leads to the following chapter where the two case studies are compared and contrasted to assess what elements of the open system impacted the productivity results.

Case Study - Fortis

Chapter 7: Case Study: Artesia

This case study introduces the IS operations and decision making processes of BACOB Bank during the period 1994-1998, which therefore includes the acquisition of BACOB by Artesia Banking Corporation, and BACOB's acquisition of Bank Paribas Belgium and of the retail operations of Artesia, all of which happened during this timeframe. This case study describes the organizational structure, IS infrastructure, operationalisation of organization, the quantitative analysis of the bank IS spending, and a discussion on the IS impact on the organization and its competitiveness.

In March 2001, Dexia SA, Belgium's second-largest bank, announced its intent to purchase Artesia Banking Corp. for more than 3 billion euros (\$2.8 billion) to boost its branches in the country by 50 percent, according to Bloomberg's wire service. Dexia was not included in this research, given this timing of this announcement was done after the research was finished.

7.1 Introduction to ARTESIA Banking Corporation

Artesia Banking Corporation is a medium-sized European financial services group. Its risk-bearing assets amount to 3.7 billion EUR (of which 1.5 billion EUR are own funds). In 1999 consolidated net profit achieved 188 million EUR, with a return on equity of 14.73%. Artesia BC has over 1,500 outlets and 1.2 million customers. The Group rests on three pillars, which have since long been operating on the Belgian market: merchant bank and portfolio manager Artesia Bank, BACOB Bank for the retail business and DVV insurance.

99.6% of the capital of the public limited company Artesia Banking Corporation is held by the financial holding company Arcofin. The group structure offers various endogenous and exogenous growth possibilities, like financing in the form of Tier 1 capital and various forms of borrowed capital.
Artesia Banking Corporation is a strong banking and insurance group, with presence in Belgium, the Netherlands, Luxembourg, France, Ireland, and the United States, as shown in Figure 7.1.

Throughout its history, Artesia has cultivated an excellent reputation in the following activities: international bond issuance and syndication, commercial lending; advisory and discretionary asset management. Its scope has always been international, with clients and business partners across Europe and beyond.



Figure 7.1: ARTESIA Overall Structure

Artesia Banking Corporation's mission is to expand into a high-quality European financial services group with an international position and a range of products focussed on customer value. The Group consists of a number of different legal entities, which each act as competence centers targeted to specific customer groups. Artesia BC gives special attention to the recurring nature and the diversification of its income. The focus is on fine-tuning the capital allocation, enhancing commercial

efficiency and strengthening the international position. For the implementation of its strategy Artesia BC can rely on more than 7,500 employees.

7.1.1 Pre-merger

The history of BACOB Bank goes back to its roots as a cooperative bank, started as the savings bank of the Belgian Workers' Cooperative (Belgische Arbeiderscoöperatie, known as BAC, or in French COB, Cooperation Ouvriere Belge) therefore the bank was called BACOB).

Given its strong local anchorage, BACOB Bank has for a long time has played a key role in the welfare sector as the reference banker of hospitals, rest homes, schools, institutions caring for the handicapped, kindergartens, social housing companies and socio-cultural organizations.

Ownership of BACOB Bank, prior to its link-up with Artesia, was structured as such:

65.0% Arcofin c.v.30.4% Clients4.6% Personnel

Arcofin consisted of members of the LVCC union and the Christian workers cooperative, with Arcofin as the reference holder for the members.

7.1.2 Post-merger

BACOB is still a brand name that consumers can recognize. Unlike its Belgian counterparts involved in mergers, entry into Artesia did not add more retail operations to the mix. Therefore, retail is still BACOB's to run, although being a part of the Artesia Group has changed some of the processes and methods.

As an original partner in BACOB's purchase of Banque Paribas Belgique (renamed Artesia Bank), Arcofin C.V. - part of the Arco group - is a majority shareholder in Artesia Banking Corporation (Artesia BC).

1998 was Artesia Bank's first complete year within the Artesia Banking Corporation financial services group after BACOB Bank acquired a majority share in the capital of Paribas Bank Belgium in 1997. The bank changed its name to Artesia Bank in March 1998. The change of shareholder base brought about significant structural changes but most importantly it meant new opportunities. Artesia Bank has become the central point within the group for all the non-retail activities.

BACOB Bank is one of the top five Belgian banks and still directs its services largely towards families, professionals, one-man businesses, small to medium-sized businesses and the social sector. In 1999, in the framework of the new group structure, BACOB Bank is the competence center for Artesia Banking Corporation's banking business in the retail and social welfare sectors. BACOB Bank is a "proximity bank" with 78 regional offices, 465 local branches and a network of 16 account managers for the welfare sector.

Information Technology is part of the Artesia Services organization, which provides resources to all of the companies of the Artesia Banking Corporation: DVV, BACOB, Artesia, Eural, etc.

7.2 Structure

7.2.1 Mission

As the Group's retail competence center, BACOB Bank targets private individuals, the self-employed, liberal professions and local companies. As a co-operative company, it distinguishes itself from all the other banks in Belgium by making co-operative ownership by customers a central feature. It is a proximity bank that offers more than 900,000 households first-quality products and services. To do so, it can rely on large branch network and efficient self-banking, phone banking and electronic

banking facilities. BACOB Bank has undeniably become a reference in the field of ethical investment funds in Belgium. Eural services target groups similar to those of BACOB, but does so through a network of independent agents. BACOB, together with DVV insurance, also develops combined banking and insurance products for this sector.

BACOB Bank was the first institution in Belgium to launch an ethical fund with the possibility for both the customer and the bank to share part or all of their yield with a good cause and to apply ethical criteria. Only companies that take positive action to meet those criteria can be included in the portfolio. Reasons for excluding companies from the portfolio would be involvement in arms dealing or arms production, failure to implement an equal opportunities policy, use of child labor, involvement in nuclear programs and animal testing. BACOB Bank offers five ethical forms of investment and in Belgium has a 56.34% share of the ethical investment market, according to Artesia annual report for 1999.

After a number of intermediate technical and legal stages, the non-retail business of BACOB was taken over by Artesia Bank in 1999 as part of the restructuring of the Arco/BACOB group, and together form Artesia Banking Corporation sa. Since Artesia will concentrate on non-retail business, twenty-four Artesia branches and their staff were transferred to the BACOB branch network. The brand name "Artesia Bank" will be retained as a second name.

7.2.2 Organigram - Management

Post-Merger

Artesia Banking Corporation has a Board of Directors and a Management Committee. The organization structure is segmented into areas by Management Committee member and their respective areas of responsibility, as seen in this organigram of 1998 in Figure 7.2.

Case Study - Artesia



Figure 7.2: 1998 Organigram for Artesia BC

As of mid-1999, all the back-office activities of the Group were concentrated within the cost-sharing company Artesia Services in which Artesia Bank, BACOB Bank, Cordius, Eural, Banque Dréze, Gesbank and Landbouwkrediet / Crédit Agricole are members / shareholders. Artesia Services is a cost-center, where all costs are divided according to fixed criteria among the members / shareholders who show them in their profit and loss accounts. Artesia Services aims to exploit the advantages of synergy to be gained by bringing together all the Group's back-office activities under its wing, aiming for increased efficiency and service of an even higher quality.

Pre-Merger

BACOB has not changed structure significantly from before it joined Artesia's structure. During the 1994-1997 time period, there was the traditional board of directors and management committee members. These management committee (directiecomite) members were in charge of specific activities, shown in Figure 7.3, and like other Belgian banks, IS was lumped together with facilities management and

risk management, under the leadership of Guido Allegaert, who now runs the IS organization for Artesia Services.



7.2.3 Organigram - Metiers

During the timeperiod in question, as well as now in Artesia, the retail operations have been run as an individual business unit from corporate and investment banking. In the period from 1994 until 1996, the business units, also called Métiers, were run with a product focus, where the organizational structure was based around the products on offer, for the retail side, and based on the corporate activity for the non-retail side. For example, in 1994, the mortgage products were doing quite strongly, and were developed into a multi-product offering.

As BACOB started to join the Artesia Group in 1996-1997, BACOB changed its structural design to fit more with the competitive changes in the banking market in Belgium. The focus changed to more of a customer orientation, and on the retail side, this meant segmentation between areas such as welfare, youth, pensioners, and self-standing businesses.

7.2.4 Organigram - IS

The IS model for BACOB, both prior to the Artesia merger and afterwards, has been structured to support the individual lines of business. Each line of business (retail, corporate, private, financial market activities) had a IS business manager looking after the application needs for the line of business. On the horizontal level, there is a team looking after the common business services and support needs, both on a batch and real-time basis.

Now Artesia Services provides the same resource coverage in IS as the BACOB IS team did prior to the creation of Artesia Services, focusing on common platforms and business architecture for cost effectiveness, as shown in Figure 7.4.

Retail	Private	Corporate	Financial
[BACOB, Cortal]	[Banque Artesia,	[Banque Artesia]	Murket
	Cordius Asset		Activities
	Management		(Banque Artesia)
Individual Basic S	ervices		
Common Business [Payments, Settleme	Services ents, Custody, etc.]		
Common Support			
[General Ledger, Cl	lient Acctg., MIS & D	ata Warehouse, Risk N	/Igmt]

Figure 7.4: Artesia Services - IS Uniquely Oriented to the Business Units

7.3 Infrastructure

In structural terms, far-reaching integration started with the link-up of the dealing room of BACOB Bank and Artesia Bank in November 1998 and the centralization or risk management. A joint Management Committee took over on 1 October 1998. This Committee is responsible for managing operations in both banks. In accordance with the guidelines in the strategic plan, consensus was reached on the basic brief and organizational profile of the integrated management bodies. The implementation of this, and the integration of the supporting management bodies, is well on the timetable.

7.3.1 IS Equipment

Unlike most banks in Belgium, BACOB had not been reliant on IBM, instead they were a Unisys mainframe user. This actually benefited them only slightly in the integration of Paribas, since Paribas Bank Belgium was based on the Sun Microsystems client/server platform. BACOB has been known as one of the more innovative banks in Belgium in terms of technology, and was one of the first to have PC banking and telephone banking.

7.3.2 Post-Merger Infrastructure Changes

One of the major responses to the increasing intensity of competition is to be found in terms of cost efficiency. The retail network of office staff and self-employed agents was further streamlined during the course of 1999. This involved the creation of larger commercial units with a more efficient work organization and the focus on providing a more professional service. This streamlining operation extended to the whole of the banking retail network :

- The BACOB-network was restructured into 78 regional offices, supplemented by 465 local branches.
- The branches of Gesbank and Banque Dréze were prepared for being transformed into BACOB branches following their integration into the group.
- Some of the general banking branches of Artesia Bank have already been transformed into BACOB branches. This process has been continued during the year 2000.
- · The network of self-employed Eural agents was streamlined.

Furthermore, on 1st June 1999, all the Group's back-office activities were brought together within a new company, Artesia Services, whose costs are shared throughout the Group. This goes hand in hand with the introduction of a system for continually measuring and monitoring the quality of the Group's administrative procedures.

7.4 Operationalisation of organization

7.4.1 IS Infrastructure - Pre-Merger

The IS decision making process at BACOB Bank, according to the interviewees from the BACOB side of Artesia, was much more formalized prior to the entry into Artesia. The business case for IS development was a combination of IS and business requirements, focusing on adding value to the process. The business case focused on both quantity and quality aspects of the business, as in increased number of transactions and transaction speed, for example.

Allocation of resources and in investment were decisions made by the ordinance committee, at the Board level. This was done three times a year, based on a strategic orientation between needs of the different business units. The chairman of BACOB before the merger was thought by the current IS staff to be a believer in the role of IS in the organization. No comment was made about the current Chairman.

IS planning tried to make the link between the business and IS, both from a functional and from a technical side. It was not always a success, given a lack of certain IS skills and business credibility with the business units.

7.4.2 IS Infrastructure - Post-Merger

According to the staff interviews, the IS decision making process at Artesia Bank is not so procedural as before the merger, and the focus is more results oriented. One individual mentioned a "cowboy" mentality. Prioritization is based on quality versus timing, looking at organizational issues and control mechanisms.

Implementation of IS has integrated in a good deal of user involvement in the project specification and management, driven by top down initiatives. IS staff members felt that more Board level involvement led to better success of the planning group.

Post-merger IS business decisions have a change of prioritization from the pre-merger BACOB days, with more focus on the business domain. Decision meetings are held once every two months, and are based on the business case. Development has become more business oriented, and is based on four groups (retail, corporate/private, foreign monetary exchange (FME)/risk, and the horizontal support functions). This provides an overlap between product and activity development per business unit. The IS team within Artesia Services has developed competency centers that are both functional (i.e. Credit) and technical (i.e. data warehousing).

The first line of business support is the user contact, for either external or internal help desk functions. The second and third level of support is at the data center, usually mainframe based. Both BACOB and Artesia in their previous structures did not have an internal IS structure understood by users for communication purposes. Current IS structure, with a cost center focus, is trying to set communication vehicles in order to serve the user needs.

7.4.3 Process Change and IS

BACOB has been known as an innovator in Belgian banking for quite a while. When BACOB Bank introduced its first banking machines back in 1987, it was an initiative that was correctly hailed as a major step forward along the path towards self banking, a concept consumers all take for granted these days. Since then, the Microsoft Windows NT platform has been adopted by BACOB Bank. The bank's management was also of the opinion that the time had come to modernize its network of automatic banking machines by moving towards harmonization. In doing so, it set out other precise objectives. In fact, the process also involved extending still further the range of functions offered to users and better integrating the equipment involved into the control system for the branch network. Obviously the payback of this type of investment depends on the number of transactions being made. The figures are there to prove it: in 1998, BACOB Bank customers made some 30 million transactions via automatic banking machines, representing an increase of 20 percent over the previous year. Deployment across the whole of the branch network is scheduled to be completed by the year 2001. As a result, the strategy put in place by the bank is creating a faster, more comprehensive and user-friendly service. In the longer term, the solution described here will make it possible to envisage other types of web-based applications - so much so, it would be possible to re-use modules developed for other types of application on the same hardware. Progress has also been noticed by branch staff who have had their administrative load lightened, enabling them to spend more time dealing with and advising customers. The goal of these types of process changes is to allow the human element of banking to provide the additional value added it is skilled at, advice and interaction. In addition, according to BACOB's IS Director, streamlining and automating retail processes via electronic means is going to lower the cost of transactions, increasing bank profit.

7.5 Description of Quantitative Data and Discussion

BACOB	1994	1995	1996	1997	1998
IS Labor	4.01%	4.50%	5.65%	7.58%	9.03%
IS Capital	13.35%	12.33%	7.81%	8.14%	9.21%
Non-IS Labor	55.84%	55.35%	45.17%	49.01%	53.91%
Non-IS Capital	26.80%	27.81%	41.37%	35.27%	27.85%
Total Cost	100.00%	100.00%	100.00%	100.00%	100.00%
Change in number of offices	0	-0.09	-0.11	-0.12	-0.12
- Base year 1994					
IS Cost as a percentage of total cost	16.80%	16.80%	13.46%	15.73%	18.24%
IS Cost as a percentage of net bank income	NA	NA	65.20%	64.50%	56.08%
IS Cost as a percentage of total bankproduct	NA	NA	8.76%	10.11%	10.17%





Regression	Coefficients
Analysis	
Intercept	2.961457
LNC	-0.02603
LN K	0.230937
LN S	0.268528
LN L	2.228794

In the initial discussion in Chapter 4 on the overall industry, it was shown that BACOB, in comparison to the other top banks, had the 'best' results in terms of both coefficient of elasticity and in terms of significance. In running the regression analysis for BACOB only, using the same four inputs, using again sum of loans and deposits as the output, the input of non-IS labor appears to have the most positive coefficient, with IS capital as the lowest coefficient of the four inputs. It appears that non-IS capital had a more positive contribution than IS capital to the profitability during this period.

Additional insight comes from the trends on input spending over the five year period. In looking at Figure 7.5, it is visible that the period of the merger showed an increased investment in non-IS capital, and a decrease in non-IS labor spending, as to absorb the additional staff of Paribas.

7.6 Table of OS elements, and discussion on IS impact on OS and competitiveness

Table 7 1.	OS Flomante for BACOP
Table /.1:	US Elements for BACOB

Main Element	Component	Description
Inputs (or resources)	Financial Assets / Capital Assets	During this period 1994-1998, the financial assets of BACOB were quite healthy. Given BACOB's origins as a savings bank, Artesia BC has abundant retail funding on a consolidated basis, which exceeds its volume of customer loans. Its consolidated credit risk is low: customer lending, which represents around a quarter of the bank's balance sheet, is focused primarily on domestic residential mortgages, in addition to corporates and non-profit social organizations such as hospitals. Its relatively low net interest margin partly stems from its high levels of Belgian repurchase (repo) market activities, where it has enjoyed a 40% market share. This also contributes to high levels of liquidity. However, net interest revenue accounted for only 57% of Artesia BC's total operating income at end-1998. Artesia BC has expanded other operating income such as asset management fees. Funds under management at Cordius, the bank's asset management subsidiary, expanded by 37% during 1998. Artesia BC's costs are similar to those of its domestic peers, but its cost/income ratio is above average internationally, reflecting both a large branch network and investment in new IS and trading systems, which have helped the bank to monitor its trading and market activities. Artesia BC has surplus capital and "hidden

Case Study - Artesia

reserves" and at end-1998, it was well capitalized with an EU total capital ratio of 12,11%.

Distribution Network

cetan on	ices:	
	1994	1998
BACOB	630	552

Artesia BC has 1,138 outlets and 6,163 staff in the Benelux region, as well as being present in Ireland, the USA, France and Austria. In contrast with other new groups in the field of "bancassurance", Artesia Banking Corporation planned to only make minimal reductions in its branch network and there are no plans for cutting staff numbers. As far as both distribution channels and staff allocation are concerned, restructuring was planned according to fields of specialization and business lines.

Em	-1	low	000
CHIP	DI	υv	COS

 Full time employees:

 1994
 1998

 BACOB
 3,391
 3,699

Employee figures during this period show the number of full-time employees grew 3.7% over the years 1994-1997, in line with the figures of the top seven banks, who grew at 3.9%.

Outputs Product/service During this period, the focus changed from a mix product specific sales model to a customer oriented (demographic) sale. This required a different data view of the outputs of the organization, which led to organizational structure changes.

Case Study - Artesia

Reputation / Ratings	At the end of this period (early 1999), Fitch IBCA produced ratings of 'A+' for Artesia BC, which was the same rating previously held by BACOB by itself. Fitch, a major financial institution rating agency, felt this rating reflected the bank's performance, sound asset quality and capitalization, as well as its size. Its group structure concentrates expertise, which should result in optimization of resources. Other ratings for BACOB in this timeframe included S&P Rating as of June 1999 of 'A'.
ROE / ROA	ROE/ROA has historically been above industry averages, even prior to the merger with Artesia.
Level of Automation: Internal versus External	Externally, BACOB has been considered innovative in its delivery channels, including introducing PC and telephone banking in Belgium.
	Reputation / Ratings ROE / ROA Level of Automation: Internal versus External

Level of automation internally can be viewed by the personnel supporting the automation efforts. Data from the BVB annual survey collects spending on equipment by hardware, software and network categories, and on personnel by the activity the personnel is involved in. According to company internal BVB survey figures, the amount of IS personnel investment in specifically internal processes (internal education, computer audit, administration) was approximately 5.7% of total IS personnel spending in 1994. In 1996, the terminology changed in the BVB survey, lumping internal and external support processes not directly related to operations or development into one category. If recalculated to this 1996 terminology, support functions were 12.8% of total IS personnel spending, dropping to 10.2% in 1998, based on significant growth in the development and operational personnel area.

Banks themselves are highly automated, being a service business, but in terms of internal processes, a possible measure of automation is the increase in software purchasing investment (as opposed to software development) to automate processes such as word processing, e-mail and messaging, and other forms of standardized data entry. In 1994, 2.6% of total IS cost was software purchasing, rising to 4.09% in 1998. The top five banks for 1998 was 4.73%, roughly in line with the rest of the top banks.

Environment Task

Environment
- conditions
- organization

 physical surroundings Bacob operates from a strong center. At the time, all management functions were exercised at headquarters in Brussels, in a building custom-built and owned by Bacob. Much space is reserved for training, long a focus and strength of Bacob, as all (including field) employees are trained initially and thereafter continually at headquarters. Bacob has a strong culture of equality and openness, expressed in open-floor plans and few separate offices, reserved for top managers only.

General

Environment

- Ownership
- External Links
- Expansion possibilities

Departments and units are, hence, physically clustered together. Regular business meetings and communications to the field via written memo's and through the regional offices and area managers ensure a flow of information up and down the line.

Case Study - Artesia

		As mentioned in section 7.1. Arcofin is still a large player in the ownership of BACOB / Artesia. The external links to the labor unions and the unique customer ownership provides a strong domestic brand, but little possibilities of expansion outside of Belgium. Previous ownership of UCL, sold to what is now Fortis, shows the disinterest historically in retail expansion, although Artesia, on the investment/commercial front, does have possibilities to expand.
Goals and strategies	Goals Objectives	As previously mentioned in section 7.2.1, as a co-operative company, BACOB distinguishes itself from all the other banks in Belgium by making co-operative ownership by customers a
	Strategy	central feature. It also highlights its emphasis on ethical investment as a unique feature, and
	rians	offer a more tailored package of products and services.
		Future plans during this timeframe focused on the integration of Paribas and other Artesia offerings into the retail operations. The goal of mid-2001 for the IS integration is still in plan.
Behavior and	Patterns of	For IS investment, decision making was
processes	decision making	formalized under BACOB, and less so under Artesia, as discussed in section 7.4. Decisions for the metier needs are made in conjunction with the IS business manager for the Metier and the business managers for products and services within the Metiers. These are prioritized in accordance with the new Artesia Services IS project prioritization guidelines, and then put before the management committee during the

Case Study - Artesia

Strategy	Artesia BC, as others in this period, are
Formulation	concerned with the changes in the local market.
	The stated strategy of the Corporation was " in
	the highly competitive Belgian environment and
	the new European banking landscape following
	the launch of the euro, we have to adapt our
Conflict	company to the new conditions by
Resolution	diversification, cost effectiveness and
	international expansion. Only by adopting a
	"one group - one team" approach can we turn the
	major challenges facing us into lasting success."
	In order to make the most of new opportunities
	and economies of scale, a strategic plan for the
	group was drawn up in 1998 to determine the
	tasks and objectives of all the units in the
	financial services group. The guiding principle
	was a diversified and optimal market approach,
	the key concepts being synergy and
	specialization. Therefore, decisions such as the
	creation of Artesia Services to provide resources
	to the whole group, is an example of the
	formulation and implementation of the strategic
	direction of Artesia BC.
	In terms of IS investment and IS projects,
	conflicts in prioritization were mediated at the
	management committee level during discussions
	on spending priorities.
Strength of unions	
/ other	Given the ownership, unions have a strong role
organizations	in BACOB, as do certain political affiliations.
	Given BACOB's background, employee
Employee	involvement is process making is accepted and
involvement in	even encouraged.
process making	

Case Study - Artesia

	Communication styles	Communication is open and intense, with discussions through formal and informal meetings, and informal writings. Oral and direct communication is favored over 'write me a memo' style.
Culture	Symbols of organizational identity	Although many Belgian banks are going through a re-branding exercise as a function of mergers, the name BACOB has remained for the retail operations. This is due to its local reputation, strong name recognition, and relationship to its ownership. BACOB is also a sponsor of top sports: it was at the time the main sponsor of the successful Belgian judo team.
	Investment in Art Physical appearance of corporate office, branches	BACOB has invested in contemporary art and its headquarters, which is also an architectural showpiece, shows off some of the more striking pieces in its collection. It prides itself also on an in-house architectural team that, sometimes with outside help, has won prizes for its original retail banking buildings. Artesia also has created a 'Center for the Arts', and invested in art, sculpture and architecture.
	Linguistic Culture Style of work / hierarchy	BACOB's working language is Dutch, with even French-speakers adapting in meetings. Decision-making documents and minutes are routinely drafted in that language except where they specifically concern the Walloon or Brussels region.
		BACOB's style, again harking to its union roots, is informal but stylish and with pride in accomplishments: no sloppiness allowed here. The organization structure is relatively flat, and top management is readily accessible: the open

S

door principle is not only stated but also practiced. In relations between lower and higher ranking members; rank is recognized but it is frowned upon to insist on it, and it carries responsibilities, not prerogatives.

The value and possibility of changing or innovating, the way work is done, is middle of the road. On the one hand, new ideas are welcome and discussion is open, but on the other hand, a certain consensus culture and the banker's natural risk aversion will make for a slowing down. Top management will sometimes, however, pluck ideas and bring the rapidly to decision: BACOB has a history of bold management moves based on visionary ideas about what is to be done.

ructure	Basis for grouping	Retail operations were grouped into regional
	of metiers /	directorates. Some special programs, such as
	Distribution of	school savings, are also operating in a
	metiers	decentralized way.
	Spans of control	While SME is handled also at regional decentralized levels, the threshold for reference to a higher level, HQ based credit authorization is reached at reasonably low (e.g. 5 million BEF) amounts. Larger corporate and public sector accounts, often found in Brussels anyway, are handled at HQ centralized levels.
	Structural changes of retail operations during period	In these latter areas, involvement of high-level executives is often key in credit formulation and approval. During the period under review, retail operations were not substantially affected, as the merger with ARTESIA did not as such involve a lot of retail restructuring

NB: Background information on Belgian banking environment:

S&P Rating as of June 1	999
ASLK-CGER Bank	А
Generale Bank	-NR-
BBL	-NR-
BACOB Bank S.C.	А
Credit Communal de Be	lgique AA+
KBC	A+

The cost/income ratio of Belgian banks has come down from 71.6% in 1993 to 63.3% in 1998, and return on assets (ROA), rose from 0.28% to 0.31% over the same period. Return on equity has been more volatile. From 8.70% in 1993, it rose to 9.91% in 1997, but dropped back to 8.54% in 1998,(source: BVB)

7.7 Conclusion

Although BACOB became part of Artesia Banking Corporation, it is still one of the top five Belgian banks and still targets its services largely towards families, professionals, the self-employed, SMEs and the social sector. The commercial operations, such as international and equity markets, have gone into the Artesia operations, but BACOB still retains its strength in retail and has become the competency center for the Artesia Banking Corporation.

However, there is not much more room for local growth and expansion, given both the area in which BACOB focuses on the retail side, and given the increased consolidation of the retail market in Belgium. Growth will have to come from nontraditional routes to market, such as electronic banking, focusing on the specific areas for which BACOB is known. This does not, however, include the non-retail area, where Artesia has a number of outlets for growth. In terms of growth and profitability, this period was one of decreasing number of branches, and of an increasing cost of technology. IS cost was impacted by the acquisition of the retail portion of Artesia and by innovation in alternative delivery methods (PC banking, telephone banking, etc.). The decreasing branches helped the investment figures in the non-IS capital area, but the unionization of the bank restricts what non-IS labor consolidation can be achieved, which is why the bank is focusing on IS investment to lower transaction costs.

IS investment processes changed in 1997 in terms of methodology for decision making, going to a less formalized, but more bottom line oriented model. Changes in the frequency of decision making and the increased focus on the business case has intensified the need for the creation of additional value from the IS organization, and the link between the business and IS functionalities.

Structural changes in decisions for IS investment since the Artesia merger have changed the focus to the workflow of the project, versus the appropriate skills sets that are available. The results of this change are not yet visible, given they are recent (2000) and certainly not in the data available for the timeframe looked at for this research. However, given the comments from staff that have been involved in both processes, the structure adds credibility to the process, but it is not yet clear what the results from measuring the benefits will be.

Changes in organizational support, by combining services in a common architecture approach (as shown in Figure 7.4), has provided a logical method of creating value that can be utilized across business lines.

The next chapter will compare the two bank case studies, and lead to what conclusions can be drawn from these studies in regards to the research questions.

Back-up Information on Artesia

Background on Artesia BC, end of 1999

* in million EUR

Balanstotaal *	86 715, 9
Eigen vermogen*	1 498, 5
Risicodragend vermogen *	3 726, 2
Nettowinst (aandeel van de Groep) *	187, 9
Return on equity (ROE)	14,73 %
Ratio Tier 1	7,19 %
Risicogewogen solvabiliteits-ratio (CAD)	12,14%

Ratings	Short-term	Long-term	
Moody's	P-1	A2	
S&P	A-1	Α	_
Fitch IBCA	F1	A+	
Thomson Bankwatch	TBW-1	A+	_
		101	

Chapter 8: Discussion on Findings

This chapter will discuss the findings of the research, segmented by the three research questions. The research questions consisted of:

- Are there measures that can evaluate how effectively banks utilize IS investments?
- 2. What impact does the organizational structure have on the IS output performance?
- 3. What are the areas of potential change within the organization that can positively impact the use of IS investments?

Each section has a discussion of the findings for that question, with a summary section at the end of the chapter.

8.1 Discussion of Research Question One

Question 1: Are there measures that can evaluate how effectively banks utilize IS investments?

Even before the term 'productivity paradox' was first used, companies have tried to measure investments in what has been called technology, whether it be machinery or other non-human tools for process productivity. In a manufacturing context, determining production efficiency improvement where physical goods are the output and workers are compensated on an hourly basis is much clearer than today's dilemma of intangible activities and workers on a annual or project-based compensation.

As a service economy, banks focus on transactions as the currency of trade, and lowering the cost of a transaction increases profitability. Margin requirements are different in the different areas of a bank, since the components and definition of a transaction differ by horizontal activity (i.e. credit versus foreign currency exchange). Strictly focusing on retail transactions, cost components of a transaction include internal activities to process the transaction in-house, delivery mechanisms to reach either the payer, the payee, and any other third party involved in the transaction (i.e. credit card companies, other banks, etc.) with set fees involved internationally for this delivery channels. The bank can take into account known external costs of a transaction (i.e. fees for SWIFT), and then must reduce the internal costs, and/or raise the fees for a transaction to make an appropriate increase in profit. Given certain limitations in fee increases within set market conditions, the focus on transaction cost reduction invariably comes down to lowering the internal process cost.

So how do IS investments impact the cost components of a transaction, and is there a way for banks to measure this impact? Transactions, consisting of data, need a combination of manual and automated processes to be achieved. As shown in the econometrics portion of the research, IS can be viewed in its contribution to the automated aspects of the process, both in terms of the physical tools and the human element for the actual automation of the process in terms of programming and maintenance of the automation facilities. The manual aspects of the process require both capital and labor to accomplish; therefore the four inputs in the econometric equation are all contributing to the cost of the transaction. Therefore, noting quantitative changes in transaction cost, and what components contributed to that change, may be a factor in a productivity assessment, which would also to take into account changes in processes that contributed to the change in productivity. However, the role of IS in profitability and competitive advantage gain can be questioned with declining costs of IS and the gradual shift of retail banking operations from hybrid paper-electronic systems to seamless end-to-end automation leading to restructuring and disaggregation of retail banking (Harker and Zenios, 1998).

It is clear that IS aids in navigation, or search, and reduces transaction and information costs by giving people, both internally and external to the bank, easier access to a wider array of data. IS also aids in delivery costs in the transaction: services can be delivered electronically, or much of a delivery process can be automated. This means a cost reduction due to less paper clearing, fewer paper records, and reduced need for brick-and-mortar branches. Some functional problems will remain the same, though the delivery systems differ dramatically. For example, customer complaints about a long line or unhelpful teller will become customer complaints about programs that crash. But how IS adds to the productivity and profitability is not as clear, and the following discussion looks at these issues for the overall Belgian banking industry.

In measuring the overall Belgian market, the results, as discussed previously in Chapter 4, of the econometric analysis for the hypotheses focused more on the productivity analysis, using both the sum of Total Loans and Total Deposits and Net Income of the bank (Revenues) as the output measure for each of the five years in the stated timeframe. ROE, as an output for profitability, was also examined. ROA data was not readily available from the BVB for this timeframe.

Table 8.1 provides the data set for the overall industry analysis, as shown previously in Chapter 4.

The top seven banks and their differences are discussed in Section 8.2.

Inputs (in Billion BF)	1994	1995	1996	1997	1998
IS Labor (S)	10.9	10.9	15.2	15.9	17.8
IS Capital (C)	29.3	30.6	29.0	32.3	39.8
Non-IS Labor (L)	165.1	167.0	170.7	171.6	175.5
Non-IS Capital (K)	119.1	120.4	133.8	148.5	163.8

Table 8.1: Overall Industry Data for Regression Analysis

Outputs

Productivity					
Sum of Total Loans and Total Deposits	23,374	24,853	27,062	29,205	29,349
(billion BF)					
Net Income of the bank (Revenues, in billion BF)	55.3	53	68.5	76.5	89.3
Profitability					
ROE = "net income as a percentage of total	8.05%	7.79%	9.47%	9.91%	8.54%
shareholders' equity"					

8.1.1 Overall Industry: Test of Hypothesis When Output = Total Loans and Deposits

	Coefficients	
Intercept	-29.4371	
LNC	-1.17606	
LN K	1.9923	
LN S	-0.99278	
LN L	7.112332	

H1a: We see that the elasticities (the coefficients) associated with IS capital and IS labor are both negative. Thus, we are not able to establish evidence to support Hypothesis H1a for IS capital (i.e., that IS capital [C] produces positive returns in productivity). It is interesting to note that the elasticity of non-IS capital is definitely positive, implying that non-IS capital investment is relatively better than investment in IS capital.

H1b and H1c are also negative, as both β_1 and β_3 are negative coefficients. Therefore, not only does it imply that the returns of non-IS components are positive, but the returns are significantly higher than those from IS capital and labor.

The rationale for these findings could be tied to the investments in a dense branch network in terms of non-IS capital investment, and the high level of unionization and social charges that require a high investment in branch personnel.

8.1.2 Overall Industry: Test of Hypothesis When Output = Net Income

(oefficients	
Intercept	26.98355	
LNC	0.674255	
LN K	0.159245	
LN S	1,163221	
LN L	-5.63785	

H1a: We see that the elasticities (the coefficients) associated with both types of capital expenses are positive, while those associated with the labor variables are mixed, positive for IS labor and negative for non-IS labor. This is perhaps reflective of the banking industry where the emphasis on service delivery implies that labor is a more worthwhile investment than capital. Given that the results imply positive productivity with investment in IS capital, with a greater figure than non-IS capital, we accept H1a, and conclude that IS capital investment impacts positively on productivity. And IS labor, when analyzed with Net Income of the bank as the output measure, is associated with increase in the output of the bank.

8.1.3	Overall Industry: Test of Hypothesis When Output = Return on Equity
(ROE)	

3	Coefficients	
Intercept	-6.55029	
LNC	-1.65549	
LN K	2.265444	
LN S	-0.43387	
LN L	0.868839	

H1a: We see that the elasticities (the coefficients) associated with IS capital and labor are both negative. Thus, we are not able to establish evidence to support Hypothesis H1a for IS capital (i.e., that IS capital [C] produces positive returns in productivity). It is interesting again to note that the elasticity of non-IS capital is definitely positive, implying that non-IS capital investment is relatively better than investment in IS capital, and even better than non-IS labor. This could be a function of the level of branch banking in comparison to the level of computing automation used during this period.

The implication of this finding is that the availability of IS to all banks implies that IS investment does not provide any competitive advantage and additional investment in

IS does not stand to make any profitability gain, such as in increased market share. In fact, by not investing in IS and foregoing the gains provided by it, a bank could lose market share (Clemons, 1991). In this case, the banks could be seen to put their investment in non-IS capital and non-IS labor, as to better reach the customer base with more personnel and a high level of branch offices.

8.1.4 Multicollinearity

In the estimation of a Cobb-Douglas production function, it is usual to expect relatively high correlation between the independent variables. In this case, there is the likelihood of high correlation between IS capital and IS labor investments. As Kennedy (1985) notes, "The existence of multicollinearity in a data set does not necessarily mean that the coefficient estimates in which the researcher is interested have unacceptably high variances. The classic example of this is estimation of the Cobb-Douglas production function: the inputs capital and labor are highly collinear, but none the less, good estimates are obtained." For example, the t-statistics obtained in the analysis for the top seven banks for IS capital imply that IS capital is not a significant variable in the regression, with its estimated coefficient tending to zero. That this result is not due to collinearity problems, but a result of the estimation, is borne out by the low correlation between IS capital and IS labor investments over the five year period of the data.

8.1.5 Analysis of Results for Overall Industry

Productivity

For productivity measurement of investment in IS Capital, it can be shown that IS capital makes zero, and even perhaps negative, contribution to output both when Total Loans and Deposits is considered as the measure of output (following the value-added approach discussed in Section 4 and below), but has a positive results when Net Income of the bank (or Revenues) is the output measure. Both with Total Loans and Deposits and with Net Income as output measures, we see that IS labor contributes in a similar manner as did IS Capital to output.

Profitability

For ROE, the easy availability of IS to all banks implies that IS investments do not provide any competitive advantage. In other words, since there is no "barrier to entry" in terms of IS in the retail banking industry, a bank investing in IS does not stand to gain additional market share as a result of its investment. In fact, by not investing in IS and by foregoing the gains provided by it, a firm may, on the other hand, lose market share (Clemons 1991). Thus, in this competitive environment of retail banking, neither IS capital nor IS labor investments should make significant impacts on the firm's profitability. The results bear this hypothesis out: IS investment has zero or insignificant effect on bank profitability for the overall banking industry in Belgium.

Analysis

So which is the correct approach to view productivity in this case, Net Income or Loans and Deposits? The previous methodology discussion in Chapter 3, section 3.3 in regards to the different ways of viewing productivity can shed some insight on this. The various approaches researchers have historically chosen to evaluate the output of banks may be classified into three broad categories: the assets approach, the user-cost approach, and the value-added approach (Berger and Humphrey 1991). Sum of Loans and Deposits uses the value-added approach, and Net Income is in line with previous research in the banking sector.

The value-added approach (or the activity approach as it is sometimes called) studies all assets and liabilities as having some output characteristics without grouping them into exclusive input or output categories. Benston, Hanweck and Humphrey (1982) state that "output should be measured in terms of what banks do that cause operating expenses to be incurred." Following this line of thought, Berger and Humphrey (1992) argue that the value-added for each financial measure of the bank should be determined on the basis of operating costs, and those that have "significant" valueadded should be considered the outputs of the bank.

Net income or bank revenue are components often considered representative of a bank's output. Using this as an output is particularly relevant to this study in view of the comparisons we can draw to other studies such as Brynjolfsson and Hitt (1996) or Lichtenberg (1995). The Compustat database that Brynjolfsson and Hitt (1996) employ in their study of the impact of Information Technology defines revenues to be the output of the few banks it includes. However, econometric studies of the banking industry have been loathe to use revenues as an output measure. This unease is illustrated in Berger and Humphrey (1992) who argue that revenues are often both inputs and outputs. To illustrate, interest and fees derived from loans can be considered to be outputs but often, business borrowers are required to hold idle deposits as a condition of the loan, and these idle deposits give rise to "implicit revenues". Berger and Humphrey demonstrate that the situation with deposits is worse, with implicit revenues contributing as much as 80% of the total deposit revenues in 1988. This leads to their conclusion: "... in banking, unlike other industries, explicit revenues are an unreliable guide to determining outputs or service flows." Net income also obviously has many areas of manipulation in terms of extraordinary expenses and other ways of changing the bottom line.

Given the structure of the Belgian banking sector (as shown in Table 8.2), where the top banks looked at in this study tend to measure their own IS progress internally by IS Expenditure / Net Bank Income, it is a measure used commercially to measure change, and cannot be discounted totally.

Discussion on Findings

Revenue	Number of banks	Percentage o	total from the Sector	
Sec. and sec.		Revenue	Employees	Offices
More than 1000				
Million	6	73,1	77,3	88,1
Between 500 and				
1000 Million	1	2,3	1,8	0,7
Between 100 and 500				
Million	23	18,3	11,2	4,1
Between 50 and 100				
Million	11	3,0	4,3	3,4
Between 10 and 50			1.040	
Million	33	2,7	3,9	2,8
Less than 10 Million				
	46	0,5	1,5	0,9
Total		1.1.1.1		
	120	100,0	100,0	100,0

Table 8.2:	Structure of the Sector (1998)	
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Source: BVB

In examining the data, and taking into account what non-IS costs the banks incur, this research suggests that both views have valid points. The Loans and Deposits data concurs with the ROE analysis, in that IS investment during this period did not bring a positive contribution to productivity nor profitability. But the net income data correlates with the banks' interpretation of the transaction cost reduction problem, which is a limitation in non-IS labor cost reduction abilities due to unionization and over-banking.

Another way to view this paradox is to look at the analysis done on the individual bank data, shown in Chapter 4. When the analysis of the top seven bank data was done, initial analysis using SPSS found that the sum of loans and deposits was a more effective method of analyzing the production function relationship than net income, given the coefficients for all of the dummy variable banks were negative when the output variable was net income.

Perhaps the answer for the Belgian banking environment is that IS had not shown a positive contribution to productivity or profitability during this time period, but perhaps IS allowed more leeway for productivity cost improvements than the non-IS labor components in external market conditions during the time period.

8.1.6 Comparison of Results to Other Countries

This Belgian overall banking market results can be compared to two other country studies (U.S. and Canada) previously published in the banking sector, as well as an doctoral thesis from Mexico on the Mexican banking market. This Belgian result is not as per previous U.S. studies such as Brynjolfsson and Hitt (1996) or Prasad and Harker (1997). This result seems to be more in conformity with those obtained in the Canadian study of Parsons *et al.* (1993), one of the few formal studies on IS in banking recently, and the recent research in the Mexican banking sector published by Navarrette and Pick (2000).

The U.S. study of Prasad and Harker (1997) used data collected through a major study in 1994 of retail banking institutions in the United States, and found that IS capital makes a slightly negative contribution to output for both productivity measurements. For IS Labor, for both with Total Loans and Deposits and with Net Income as output measures, they saw that IS labor contributes significantly to output. They also perceived in their study that while the banks in their study may have over-invested in IS capital, there was significant benefit in hiring and retaining IS labor. During their fieldwork, a Senior Vice President at a major New York bank lamented the fact that "The skills mix of the IS staff doesn't match the current strategy of the bank," and he said he "didn't know what to do about it." At the same bank, the Vice President in charge of IS claimed, "Our current IS training isn't working. We never spend anywhere near our training budget." IS labor is very short supply, and issues as basic as re-skilling the workforce cannot be addressed given the lack of sufficient IS labor in banking.

These comments were similar to some of those heard in the fieldwork of this Belgian study (see Appendix D), with comments on the mix of skills and tasks not been well matched in banks, and that IS has been in short supply during this timeperiod in Belgium as well. The findings of this research are in-line with the findings of the top

seven banks alone in Belgium, where IS Capital is not positive, but labor costs are areas of productivity impact.

The Canadian study of Parsons et al (1993) used a translog production function to try to separate the productivity effects of scale and technical change instead of a Cobb-Douglas production function for its analysis of the banking data from five Canadian Chartered Banks. Their findings showed a slightly positive contribution to IS investment, with a productivity improvement limited to a five year subperiod (1979-1984) of the 14 years they studied (1974 to 1987). The researchers termed this contribution 'modest', and otherwise, despite extensive investment in technology, there was either no change or a slight decline in productivity. As for scale effects, there was evidence of scale effects in some banking services after the completion of the ATM network. The main measured impact of technology is the substitution of technology for other inputs, particularly labor.

This last point from the Canadian research can also be seen in the results above for this overall Belgian banking research for net income. Although during this period in Belgium, IS did not make a positive contribution, it is a component that can contribute to transaction cost reduction. As Parsons, Gotlieb, and Denny (1993) argue in the banking industry, "the growth of output, and the measurement of productivity, is very sensitive to the choice of output."

The Mexican banking study, which is the doctoral research of Carlos Navarrete (2000), had findings that spending on IS does not improve banks' profits, direct income, and return on assets, which supports the productivity paradox (and this Belgian research). However, contrary to other studies that support the productivity paradox, the results point to a clear impact of IS expenditure on bank market share. Also the Mexican research showed there are one and two-year lags between the IS expenditure and the market share impact. IS expenditure also helped the banks in increasing assets, services, and customers without increasing the number of non-managerial employees and the number of branches. Given this research, it would be interesting (post-mergers) to look at the relationship of IS investment and market

share in a longitudinal study in Belgium, if an acknowledged source, such as the BVB, had retail market share figures available.

8.1.7 Possibility for Comparison to Other Regions

Given the consolidation of the local market, to understand the process of financial integration and convergence in Europe, it will be interesting to know more about the competitiveness and the efficiency of banks in different European countries. Given the role of Fortis now in Belgium, the researcher was asked by several interviewees if data on Dutch banking was available. But crosscountries comparisons have to take into account the potential differences coming from some country-specific aspects of the banking technology, on one hand, and from the environmental and regulatory conditions, on the other hand. In particular, the economic environment are likely to differ significantly across countries and these differences could induce important differences of bank efficiency through different channels. For instance, differences of the income per capita, or differences of the density of population across countries could produce significant household's demand for banking products and services.

To compare their investment output to other banks, either in their region or outside their geographic sphere of influence, one can turn to previous research done in comparing French and Spanish bank productivity. Dietsch and Lozano Vivas (1996) did a comparison of banking efficiency across the two countries by using a global best-practice econometric frontier, from which the banks in each country would be compared against the same standard. From their research, the environmental variables appear to play a significant role in the explanation of the different efficiency scores between the two countries. More precisely, their results show that the Spanish banks seem to suffer excess costs, or structural disadvantages, in order to adjust to some environmental compared to French banks, such as the lower density of population, the lower income level of their customers or the lower rate of financial intermediation.

Therefore, it would be possible to compare Belgian banking to other countries in terms of productivity and efficiency if indices can be created to include country specific environment variables during this period, and if the time period could be extended to include more data. This is an area for future research.

8.2 Discussion of Research Question Two

Question 2: What impact does the organizational structure have on the IS output performance?

For the discussion of question two, Table 8.3 provides the regression analysis data for the individual bank analysis, as previously shown in Chapter 4.

Table 8.3 - Firm-Level Regression Analysis Data: 1994-1998

 $R^2 = 99\%$

Durbin-Watson = 2.487

Model	Unstd Coefficient	Std. Error	I-stal	significance
Constant	6.0	.646	9.294	.000
LNC	1.533E-04	.046	.003	.997
LN K	-2.532E-02	.027	947	.360
LN S	.440	.041	10.640	.000
LNL	.516	.221	2.335	.035
Dummy 1 (Bacob)	.490	.250	1.963	.070
Dummy 2 (GB)	2.246E-02	.094	.238	.815
Dummy 3 (BBL)	7.198E-02	.046	1.558	.142
Dummy 4 (KB)	.105	.057	1.833	.088
Discussion on Findings

Dummy 5 (Cera)	.114	.186	.616	.548
Dummy 6 (GKB)	.178	.055	3.221	.006

No dummy: ASLK

As discussed previously in Sections 5.2.1 and 5.2.2, in analyzing the results (shown in Chapter 4) of the top seven banks individually, BACOB had the highest and ASLK the lowest β coefficients of the seven. In trying to answer the question on organizational impact, analysis of organizational structure and IS investment decision making could determine what organizational elements might make one bank more effective with IS components than another.

There are two approaches to answer the research question that can be shown from the case studies in the previous chapters. First, a comparison can be done to see what, if any, differences arise in the organizational technological dimensions, as discussed in Section 3.2. For example, did either bank have different output expectations or requirements? Were the banks in different activity cycles, and why? Was there an inconsistent assessment of technology needs?

Then, in using the open systems methodology discussed in Chapter 3, an open system component comparison can be made, as to see what elements in the organization may have an impact on IS usage and ensuing productivity.

8.2.1 Technology and Structure in the Conversion Process

Technology is the application of knowledge to perform work (Rousseau, 1979). Past research indicates that inconsistent assessments of technology has often ignored input and output activities along with critical energy exchanges between the technology and the environment (Rousseau, 1979). Rousseau and Cooke (1984) discuss the co-founding of technology and structure, and ways to conceptualize and explain the relationship, and, in this case, compare the two structures to see what differences exist. Table 8.4 describes the fundamental building blocks of the systems of

Cha	pter	8
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Discussion on Findings

technology and structure, which can be used further to describe how the organization views the technology and structure elements in its own view of IS usage.

System	Technology	Structure
Concrete Living	People and their skills	Ordering of people through time, geography, etc. and the coupling of people through authority
Concrete Nonliving	Capabilities of equipment	Ordering of equipment through time, geography, etc. Coupling of equipment through transfer devices, etc.
Abstract	Performance programs or procedures	Temporal and spatial orderings. Interactive and corrective linkages.
Activity	Activities for converting inputs to outputs	Temporal and spatial orderings. Contingent, combinative and iterative linkages.

Table 8.4: Systems of Technology and Structure (Rousseau and Cooke, 1984)

In this case, the field research information looks at the IS infrastructure around the core and supportive work, and what differences may exist between the two banks. A recent trend in Belgian banking have turned IS organizations into internal service providers as to create common architectures and not 'reinvent the wheel' by having each portion of the business use and invest in different technological architectures, making it more difficult to support. Therefore, since technology is built with common organizational interests in mind, assessing requirements and resources can be made possible due to the centralization of technology.

Table 8.5 illustrates how the bank views the different levels of abstraction of technology and structure.

Illustrative Measures, Three Levels of Abstraction Focusing on: Socio-technical Concrete First-Order Higher-Order Systems Level Abstractions Abstractions (Activity) Coordination Feedback, Business unit / Output, delay time, coordination, Metier backlog of work, requirements, etc. scheduling, unit modernity interdependence Output, transaction Output variety, Adaptivity, system Organization budgetary types, cycles of cost, system capacity requirements activity levels.

Bank IS Conversion Process Illustrative Measures Table 8.5:

Chapter 8

So between the two different banks in the case studies, what differences can be perceived from expectations of the banks at this time period, based on the documentation and interviews? These differences can be viewed by abstraction level in Table 8.6. Since the research was based on the organizational level of the banks, there is some information on the business units, but the main thrust of the research is based on organizational issues.

Level of abstraction	ASLK	BACOB	Difference
Concrete	Overall view: IS spending was focused on a reduction of transaction cost, based on lowering the gross cost of operations, with a focus on ROE.	Overall view: IS spending focused on the reduction of transaction cost via electronic delivery, given limited ability to reduce non-IS personnel cost elements, and best use of system capacity, given skills and needs internally.	Overall view: How IS spending was viewed, either as a business cost or a delivery cost, echoes each bank's view of what IS brings to the organization. The different view is IS adding value to the bottom line, or to reaching the customer base. Since IS is considered a support function in both of these banks, how the support resources are allocated and distributed within the organization are key points for a strategic view on investment in concrete components.
	People investment concerns were mainly focused on development, as the bulk of the personnel investment was there. Retaining this specialized knowledge and	People issues centered around skills and tasks, both for development and maintenance. The ordering of the	People: The utilization of people, either as a central resource or to match skills with requirements of the business,

Table 8.6: **Comparison of Two Banks by Abstraction Level**

specialized knowledge and distribution of autonomy, particularly given the hierarchical structure, were also issues.

ordering of the resources, knowledge in terms of training, and distribution of autonomy, specifically in vertical business, were also of concern.

Equipment was focused on central computer capacity, and the integration of other

Equipment issues were also skill/resource

Equipment:

differed.

Both banks looked at the equipment component as a

of how these resources

contributed to the business

centralized resources from KN, and then from Generale Bank.

focused, particularly towards the end of the time period with a common architectural view.

Structuring and ordering of concrete components:

What status and organizational position was given to IS during this period could be reflective of the importance of IS in the organizational structure. IS was under financial, and then placed as a separate resource item. Again, both positions focused on the cost aspects, not on the market position aspects nor specific vertical needs, of the business. Structuring and ordering of concrete components:

Positioning of IS members in the metiers as unit 'champions' gave a level of coordination between the business units and the IS organization. Change implementation, in terms of project management and prioritization, became much more visible in the business decisions made at the Board level.

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fixed, long-term decision, which can be considered wise given the level of investment, and made additional resource allocation to that fixed decision where warranted.

Structuring and ordering of concrete components:

Both banks' IS departments went through a repositioning to become autonomous resource units, supporting the whole financial services organization. But in terms of positioning, ASLK was more focused on integration of resources from a centralized perspective, and BACOB was focused on group consensus and decision making within the organizational framework.

Level of abstraction	ASLK	BACOB	Difference
Abstract	In transforming inputs into outputs, the bank focused its IS effort on coordination across both banking and insurance businesses. The projects of IS were horizontally oriented, either on platforms, horizontal applications (i.e. SAP) or on workflow streamlining for internal clients.	The co- dependence of the IS business with the metiers reinforced the role of the budgetary review in decision making and the needs to assess skills and how that matched with business needs.	Both banks focused on coordinating actions with the business, but scheduling activities were done horizontally across the business at ASLK, and vertically across the business units at BACOB.
Activity	The approach to technology and structure in activities was inclusive in nature. Cycles of patterned activities performed to create results included movement to Windows NT at the branch level for standards/costs rationale, centralization of IS resources for leverage, and inclusion of insurance aspects to retail banking operations.	The approach to technology and structure in activities was modular in nature. Cycles of patterned activities performed to create results included adaptivity to 1S industry standards, such as Windows NT, integration of resources towards a common architectural platform, and a formalization of the 1S prioritization process.	Technology is found in activities that contribute to task performance and reflect the application of knowledge to accomplish work. By standardizing, pooling IS resources, and encapsulating and/or modularizing business processes and IS, these patterns of activity provide benefit, perhaps to the bottom line. The fundamental difference in approach to these activities is the level of centralization involved – inclusive vs. modular structure of activity.

Table 8.6 cont.: Comparison of Two Banks by Abstraction Level

In looking at the organizational level of the two banks, the interaction between structure and technology was based on operational cost issues, and interrelation of business activities. The approach to the decision making (hierarchical versus group consensus) can be echoed in the approach to structuring and positioning of the IS resource in the organization, and the nature of the structure (modular versus inclusive). The cycles of activity, which can reflect the implementation of traditional or formalized procedures to accomplish some larger task or goal in the organization (Katz and Kahn, 1978), also appear to reflect the decision making approach of the individual organizations, whether it be cost related or customer reach oriented.

In assessing the relationship between organizational structure and technology usage, the quantitative research only does not provide the full picture of how the inputs are converted into outputs, and the relation and role of IS into the wider organization. In order to analyze the conversion process, qualitative research into the interactions of the open system, e.g. the individual bank, is also undertaken to add additional value to the assessment of IS productivity.

8.2.2 Open Systems Components

As discussed in Chapter 3, an organization can be viewed as an open system, and impacts of organizational functionality can come from both external and internal sources. Table 8.7 outlines the differences between the two banks, and briefly states the potential impact on the use of IS from these differences. A more detailed discussion follows in Section 8.4.

Table 8.7: Open Systems Components Comparison Chart

Main Element	Component	Differences and Potential Impact
Inputs (or resources)	Financial Assets Capital Assets	Prior to the mergers towards the end of this timeperiod, both ASLK and BACOB were of a similar size in terms of Loans and Deposits (assets), and both became part of a larger financial services group with healthy ROE and asset bases. In terms of IS, the ability to invest, in both cases, was there.
	Distribution Network	Retail offices:19941998ASLK1,1881,491BACOB630552(source: BVB) If comparing this data to their respective target customers, this is a logical distinction, as ASLK dealt with public sector, including communes, and BACOB was targeting a specific clientele which did not necessarily need so many branches. BACOB also was already dealing with electronic delivery channels (PC. Telephone), which also provide service to customers.For impact of IS, given their respective choices for branch automation, the fact that ASLK has wice as many offices may explain their long-term reliance on centralized computing and 3270 terminals.

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	Employees	Full time employees: <u>1994</u> <u>1998</u> ASLK 8.026 9.306
		BACOB 3,391 3,699 (source: BVB)
		As seen above, the growth over this period for ASLK was almost 16%, which includes the acquisition of KN but not the increase from Generale, and the growth of BACOB was 9%. Banks, according to the BVB survey, count both physical and full time employees, but calculate cost based on full time employees so we use this data here.
		In terms of IS employee growth, ASLK increased its staff 230% during this period, and BACOB increased its IS staff by 180%. ASLK has a larger number of IS staff members, which may be caused by the need for centralized development of applications. Even more specifically, both grew the portion of IS staff that is outsourced, with BACOB having a slightly higher percentage of what is called 'body shop', or consultants, at less than 20%. Most of ASLK's outsourcing need appears to be from maintenance and development in the last few years.
Outputs	Product/service mix	Each bank had a specific target audience, and therefore promoted products and services towards that target base, i.e. ethical investments from BACOB towards its clients. However, BACOB changed to more of a customer focus towards the end of the timeframe, whereas ASLK had to adjust to the Fortis Bank approach to customers in terms of universal banking. ASLK had already made the change to bancassurance during this period.
		How this impacts the use of IS is in terms of data warehousing and data manipulation to see what customers are profitable ones or might be possible for additional products and services. Both banks had improved, during this period, imaging systems and other reporting mechanisms to have easier access to customer data.
	Reputation / Ratings	No difference here, as both banks had decent ratings and recognizable presence in the Belgian retail market. Reputation differences, in terms of IS, may have made it harder to lease equipment in terms of financing, perhaps, but no other real difficulty.

	ROE / ROA	determined econometrically.
Fechnology	Level of Automation: Internal versus External	From an external view, BACOB introduced certain external delivery mechanisms (PC and telephone banking) earlier than most banks in Belgium. However, ASLK had TELES and SERVITEL, both investments during this period in better serving the client base. SERVITEL started in 1996, and is a multimedia kiosk. As of 1998, there were 60 installed in locations other than ASLK branches (such as the one at the LUC).
		From an internal point of view, the level of automation appears to have been driven by the geographic density of the branch network. ASLK, up to 1996, focused more on a centralized structure, with processing taking place on the mainframe and servers, and terminals in the branch. 1996/7 was the start of a three stage push to have Windows NT in the branch.
		BACOB was consistent in terms of percentages with the top seven in industry in terms of process automation investment. Internal training appears to be important for BACOB, and spending for internal training personnel was higher than the industry average. Industry standard technology (PC, Microsoft) came earlier as well, with involvement in a beta project with Informix for branch automation database on Windows NT in 1995. One BACOB executive said: "Participating in the beta program in 1995 of Informix OnLine Dynamic Server. NT accelerated the
		Server N1 accelerated the implementation of our applications." In the 1996/1997 timeframe, it started the process of changing the ATM network to Windows NT, and the bank's migration to a Windows NT platform for all of its equipment will continue at a steady pace because deployment right across the whole of the branch network is scheduled to be completed by the year 2001. The company intranet at BACOB again powered by Microsoft solutions, is a front- line sales promotion tool, alerting customer representatives to new product initiatives and news affecting account holders.

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In the area of moving to industry standard
technology, both banks are basically at pace
with the rest of the Belgian banking industry,
and the differences in terms of base mainframe,
network and other hardware infrastructure are
based more on historic decisions than strategic
moves.

		moves.
Environment	Task Environment - conditions - organization - physical surroundings	Many elements of the ownership and external relationships factor into the task environment of both banks. Branch work conditions and physical surroundings, for both banks, are more dependent on the geographic location than the organization. The level of automation at the branch at this time, for ASLK, depended on what phase of the NT roll-out the branch was in. BACOB branches
		From a central HQ perspective, the physical surroundings of decision makers are much the same as for the others in the bank, although on a higher floor with more secretaries. The only impact on the use of IS is the physical ability of IS and business unit managers to meet, formally and informally, which was roughly equivalent between the banks.
	General Environment - Ownership - External Links - Expansion possibilities	Ownership of these two banks is related to their ability to expand outside of Belgium. ASLK, now part of Fortis Bank, has changed ownership during the period from public to private, and from public sector orientation to universal (all- inclusive) bank orientation with a multinational financial service group. This provides room for expansion outside of Belgium, perhaps through acquisition, although the way Fortis has broken out the organization has been by geography. Therefore, it has links to other Fortis retail organizations for future product combinations. The IS impact here has been integration of acquired bank technologies, which took a while for KN and is taking a while with Generale.
		BACOB is the retail center for Artesia, but given its ownership structure and its relationship with unions and the welfare sector, is unlikely to have expansion possibilities outside of Belgium. But by retaining the retail focus for the organization, BACOB can drive its own retail IS strategy, on the common IS architecture of the Group.
Goals and strategies	Goals Objectives Strategy	Because of the change of ownership, the direction of the banks have changed.

1

Behavior and

processes

Plans

Patterns of

decision making

ASLK has not changed its focus on client services, but has changed its structure to offer clients a fuller range of services, including insurance. The goals for the IS group, in regards to the merger, were to come up with a system that provided:

- optimal customer service
- exceptional IS competence
- quick reaction times
- high investment security
- better workflow and
- · lower IS and transaction costs.

For ASLK, the change to Fortis Bank has made a significant change to direction, and to IS strategy. IS, still considered a support function, is now part of a greater resource pool, providing a service to the internal clients of Fortis Bank.

BACOB has not had as much impact on its own goals and objectives over the period, as their operations were not merged on the retail side and they still retain their strong retail brand recognition as BACOB.

In terms of IS strategy and planning, for BACOB, the difference of ownership has made a slight change in direction, specifically in terms of IS strategy. With the creation of the Artesia Services organization, BACOB has taken its own retail strategy and tied it to a common IS architecture throughout the Group. This allows leverage across the vertical businesses, and an easier base to support in terms of resources.

Two main points are IS differentiators in the patterns of decision making in the two banks: structure and power.

Structurally, BACOB appeared to have a middle-up approach to decision making – the businesses and IS made their recommendations, and then the board made the decisions. In terms of structure, ASLK had a well-defined process, and given that it was very cost focused, had more of a top-down mentality to it, although the business units still had their input.

In terms of power, in most industries it is unusual for the same person to be CIO / head of IS for several years; in the Belgian banking industry, however, it is not unusual. Both banks have had the same IS head and many of the subheads for this period, and the IS head for both banks has been with the bank for a

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	significant period prior to this period as well. Given the players do not change, the element of power and perceived position in the hierarchy becomes apparent in the decision making process. This has good and bad elements to it: continuity has its benefits, and a stable organization can be beneficial. But sometimes new blood can get an organization revitalized, or create a new structure that might be more in-line with future directions.
Strategy Formulation	The IS role in the organizational strategy has been that IS has been seen as a support function for both banks. How IS has fit into strategy formulation can be seen by the position of IS at the board level. At ASLK, IS was first under finance, then under resources. At BACOB, IS was put with facilities management and risk management. So it might be seen that ASLK viewed IS as more of a cost issue, and BACOB viewed it more of an operational risk issue, and the role of IS in strategy echoed those views.
Conflict Resolution	For BACOB, in terms of IS investment and IS projects, conflicts in prioritization were mediated at the management committee level during discussions on spending priorities. For a ASLK, business decisions were made on the basis of core versus non-core business, driven by both business need and IS abilities, and were mediated at the board level. There is not a significant difference here, and this approach appears to be standard practice in other Belgian banks as well, according to interviews.
Strength of unions / other organizations	Given BACOB's history and ownership, unionization is strong, as it is throughout Belgian banking. In terms of unions, ASLK had the influence of the joint committee competent for public credit institutions. ASLK also had the influence of the government and of local and regional government, who were a part of the client base. In terms of IS usage, these influencers did not play a major role for decision making.
Employee involvement in process making	BACOB favored a group approach to decision making, whereas ASLK had more of a hierarchical communication structure. In terms of IS decisions, as described in the interviews, improvements in IS project prioritization was a current work in progress post-merger for both banks, and is a focus for making IS and business goals more in tune with each other.

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	Communication styles	BACOB had an 'open and intense' style, with discussions through formal and informal meetings, and informal writings, not favoring the memo. ASLK tried to personalize the communications with clients, although internal communications was a bit more documentation oriented. ASLK's documentation push came from its public sector background, but came in handy for IS assessment, as everything is well documented in terms of usage and structure.
Culture		Culture is a major factor in the Belgian banking environment, with language, politics and religion all playing a part. Some of the challenges of the mergers of the late 1990s in banking involved overcoming cultural barriers and organizational legacies that were culturally related. The impact of culture on Belgian banking was not so evident in terms of choice of IS, but on IS decision making processes and on common IS architectures for the larger financial services groups, again based on organizational legacies.
	Symbols of organizational identity	BACOB has retained its identity through this period as a strong regional retail bank, and kept its name post-merger. It has not moved out of its offices, nor lost its logo or branding. For IS usage, although it is Artesia Services providing the resources, its retail brand name products and services are still supported as BACOB.
		ASLK did not lose its name or corporate identity during this period, only at the end in mid-1999 when Fortis Bank was created. When ASLK joined Fortis in 1993, it retained its identity and branding. However, towards the end of the period, when Generale was added, there was a great deal of uncertainty in the what would happen to the organizational identity. This did not carry over into the structure of the IS organization, but into the politics of the structure of the IS organization.
	Investment in Art	ASLK and BACOB were both active investors in art and culture, as well as community activities. No direct impact on IS usage came from this, however.
	Physical appearance of corporate office, branches	Physical environments are often reflective of a bank's heritage, and both ASLK and BACOB have headquarters that are unique to the bank's style and character. Both had consistent look and

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		feel of branch offices as well, and both housed the IS department at central facilities.	
	Linguistic Culture	Both banks have a linguistic heritage in Flanders, especially BACOB. As outlined in the case studies, this perhaps impacted communication styles and, to some extent, senior management choices. But it was more than linguistics that decided how the merger of the five retail banks into Fortis Bank would occur from an IS perspective, it was also corporate power and established IS infrastructures, as well as product and service mix in place at the time.	
	Style of work / hierarchy	While ASLK, coming from the public sector, was hierarchical in structure and well- documented in writing, BACOB was from a union background and more open and assertive, as well as more oral in communication. How that might have impacted the IS usage can be seen from the documentation from the period. ASLK has a well-documented IS plan, whereas BACOB had a more encompassing structure for IS project management and decision making.	
Structure	Basis for grouping of metiers / Distribution of metiers Spans of control	For BACOB, retail operations and some SME were grouped into regional directorates, whereas larger corporate and public sector accounts, often found in Brussels anyway, are handled at HQ centralized levels. IS functions tended to be centralized for communication purposes, both internal and with external partners. ASLK was a bit more centralized in its approach, with its focus on quality, customers and the synergy between banking and insurance at the retail side. Control was very centralized	
	Structural changes of retail operations during period	both for company decisions and for IS administration. IS spanned the four major retail areas of the bank from a resource perspective, from a centralized approach. Structural changes of the retail operation were more prevalent for ASLK, as the change over to the Fortis brand and approach to retail was already under discussion in 1997, prior to Generale Bank being involved. BACOB did have to absorb the Belgian offices of Paribas, but that was not as significant as ASLK with KN	

8.2.3 Summary of Findings for Question Two

Is there a relationship between organizational structure and IS performance? From the first assessment looking at differences in the organizational technological dimensions, the research suggests that there is a relationship and that IS decision making (spending, priorities, architecture, etc.) and organizational activities, in terms of expected results, have some level of correlation.

From this research, the elements in the organization that may have an impact on IS usage and ensuing productivity can be stated to be communication, culture, historical structure and utilization of resources. Communication is not only considered in terms of style, but in terms of opportunities for the businesses and IS to interact and prioritize. The business structure, both in terms of flow of information and business culture, allowed the level of information on needs and priorities to filter through, and the methodology of IS decision making was influenced by both business culture, communication styles, and power/organization structure.

But was it a case that the banks during this timeperiod had different output expectations or requirements? The foundation of the IS decisions appeared to be on the expectations of what IS could do for the organization in terms of cost/benefit, but the benefits expected were not necessarily the same. Both banks wanted to cut transaction cost, but one was more focused on the bottom line, and the other focused on customers and profitable products.

Were the banks in different activity cycles? Fundamentally, no one bank is in the same activity cycle at the same time, given different histories and different internal situations. Given both banks were involved in new, larger financial services groups, a number of the activities in terms of integration and review of processes were similar. But one bank was integrating its process with up to five other retail banks (Belgium and Nederland), and the other was integrating its processes with an investment bank.

Was there an inconsistent assessment of technology needs? Historically, given the discussions at BACOB about the skill/business requirement mix, it might be apt to say

that the resources available internally and externally have not always correlated with the business need. This concurs with the focused application development need within ASLK, in terms of spending and external resources. Perhaps it is more accurate to say there might have been an inconsistent assessment of how technology could address the business need, or what the business needed from technology. This will be further addressed in Section 8.4.

Given the expectations of the role of IS, how decisions about IS are made, and its impact and usage in the organization, the following question on areas of potential change can address how these aspects might be improved, or are planned to be changed in the new structures of these financial institutions.

8.3 Discussion of Research Question Three

Question 3: What are the areas of potential change within the organization that can positively impact the use of IS investments?

As part of the ongoing bank mergers in Belgium, management is focused on cost reduction and efficiency for competitive positioning, and is looking to find a way to qualify the usage and expenditure of IS and its benefits to the environment. In order to identify areas of potential change, one needs to identify what variables or underlying dimensions isolate the most critical variables needed to predict structural features of the organization, which according to Scott (1987), there are three aspects need to be addressed:

- 1. Complexity or Diversity
- 2. Uncertainty or Unpredictability
- 3. Interdependence

Scott (1987) outlines three major interactions between technology and organizations, which also can hold true for banks:

- The greater the technical complexity, the greater the structural complexity. The structural response to technical diversity is organizational differentiation.
- The greater the technical uncertainty, the lower the degree of formalization and the lower the degree of centralization.
- The higher the degree of technical interdependence, the more resources must be devoted to coordination. This includes efforts for standardization and mutual adjustment or coordination by feedback.

In looking at the two banks described in the case studies, the following statements can be made using Scott's interactions from above:

- Over time, both banks' organizational structure have become more complex, as involvement in different aspects of banking have diversified their activities.
- Uncertainty in terms of the process is negligible, since the process of input and the expected output, in terms of transactions, are relatively standardized for the industry. The processes are formalized, and the resources tend to be centralized for greater leverage.
- As the business metiers have become more unique, yet based on common types of technology, coordination efforts have to be more structured to address priorities for the organization and a common IS architectural direction. This can be seen also from interviews of other Belgian banks, who are standardizing on limited number of platforms to better coordinate resources.

The conversion process is a function of existing technical knowledge (what the open systems theory calls technology), the distribution of work and responsibility among groups, and the social system in which work is performed. Output control functions are determined to a large extent by the predictability of conversion processes and environmental demands for product quality, or in the case of the banking industry, by industry demands for standards to control variance of transaction costs. When looking at the organizational level, such as this research has done, one can view organizations as consisting of complex systems comprised of people and concrete components, abstractions and information, and events and behavior (Baker, 1973). To understand the manner in which technology impacts, for better or worse, upon non-technological consequences, research on organizational technology suggests that the technology construct reflects the multiple aspects of this work flow or process, which can be characterized by the five dimensions mentioned previously: input characteristics and control, conversion processes, and output characteristics and control -- all part of the open systems model.

In looking at Table 8.8, again from Scott (1981), in classifying technology measures, the measures in bold type are areas in banking that can be impacted by technology. Given that banks have to provide uniform, predictable inputs and predictable outputs for branch automation solutions, areas in which banks might utilize technology differently include managing the complexity and interchangeability of the process throughputs, dealing with the workflow and interaction between units, and managing and coordinating the output processes. This corresponds with Scott's (1981) three points, as all three fall under the category of throughputs (conversion).

Facets o	1	Stage of Processing			
Technology		Inputs	Throughputs	Outputs	
Materials		Uniformity of inputs (Litwak, 1961) Hardness of materials (Rushing, 1968) Variability of stimuli (Perrow, 1970)	Number of exceptions (Perrow, 1970) Interchangeability of components (Rackham and Woodward, 1970)	Major project changes (Harvery, 1968) Homogenizing versus individualizing settings (Wheeler, 1976) Multiplicity of output (Pugh et al., 1969) Customization of outputs (Pugh et al., 1969)	
Operations		Pre-processing, coding, smoothing of inputs (Thompson, 1967)	Complexity of technical processes (Udy, 1959; Woodward, 1965) Workflow integration (Pugh et al., 1969) Routineness of work (Hage and Aiken, 1969) Automaticity of machinery (Amber and Amber, 1962) Interdependence of work units (Thompson, 1967)	Control of outputs through stockpiling, rationing (Thompson, 1967)	
Knowledge		Predictability (Dornbush and Scott, 1975) Anticipation of fluctuation in supplies (Thompson, 1967)	Knowledge of cause- effect relations (Thompson, 1967) Analyzability of search processes (Perrow, 1970) Information required to perform task compared to information possessed	Time span of definitive feedback (Lawerence and Lorsch, 1967) Anticipation of fluctuation in demand (Thompson, 1967)	

Table 8.8: Scott's Stages of Processing, Revised

Research that corresponds with this finding comes from both Rousseau (1979) and Baets (1996). Rousseau shows that at the organizational level, input and output assessments have not traditionally been researched, but conversion aspects, such as automation and level of complexity, have been examined by other researchers. The findings have usually been closed system studies limited to the aspect being studied, such as routineness, and not the interaction and dependence of technology between the phases. In open systems research, one has the ability to examine the interaction between the environment and the technology, as well as the types of technology adopted by the organization, which is the point she makes in her 1979 research.

Baets (1996) discusses the alignment of corporate and IS strategy in banking, with results that concur with some of the interviews for this research, in that there is a

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difficulty in coordinating bank strategy with IS resources when the IS team does not understand the bank industry terminology and business requirements. One of the two banks interviewed specified how difficult it was to get IS staff that not only knew the technology, but the banking applications of the technology. Interaction in strategy planning with the business units and with the board level is also key to successful implementation of both IS and business strategy.

Both banks have created service organizations that are working on prioritization schemes for implementing technology projects in the financial services group. One of the two banks, under non-disclosure, provided the blueprint of what they were trying to implement by 2002 to improve the commonality of the technology foundations and to better assess the viability of IS projects for the business needs. The other banks in Belgium are taking similar, but not the same, approach to utilizing technology throughout the organization, so this is a well-documented example of what banks are doing to change the conversion process to make it more in-line with bank strategy and focused more on cost and business need.

8.3.1 Prioritization of IS Investment

The actual documentation of the new IS investment process is quite in-depth, but to summarize, there are three significant elements to the new prioritization of IS project investment which impact the communication and interaction within the business units and the organization:

- 1. Composition of the assessment team
- 2. Work flow of the project approval process
- 3. Construction of the business case

The composition of the assessment team includes:

- User correspondent: Business information manager, a member of the IS organization permanently situated in a business unit
- Account manager: Member of the IS staff
- · Planning committee: Member of the business unit

- Ordonancement committee: Member of a business unit
- Organization and Process optimization team: Strategic member of management, charged with executing on the global vision of the bank.

This is different than prior approaches, with more user interaction and more hands-on interface to senior management.

The work flow of project approval also is different, as it is more formal, includes several offers instead of a preferred supplier concept, and rests on the formalization of a business case for the project to proceed. (See Figure 8.1).



Figure 8.1: Work Flow for IS Project Approval

The actual business case formalization (see Figure 8.2) starts only when the IS services organization evaluates the work to be done and studies the opportunity. The formal process builds a requirements definition, and goes through several iterations and two evaluations before the project is accepted or rejected.









8.3.2 Summary of Discussion

Is IS decision-making and prioritization an area of change in the organization that can positively impact the use of IS investments? This research suggests this is the case. However, it is not possible yet to measure the outcome of the initiative discussed in the previous section, and the researcher suggests it would be several years before the implementation of this initiative, after its installation, would be measurable. But the changes in process address a number of the communication and culture barriers to a better understanding of the business/IS case, with its complexities and interdependencies, can offer one example of what areas of potential change can impact the use of IS investment.

What other areas of change might impact IS investment, from the information provided from the case studies? As mentioned above in Scott's (1987) interactions, an increased focus on coordination efforts is another possible area of impact, specifically on core competency and a common IS architectural direction. This can be seen also from interviews of other Belgian banks, who are standardizing on limited number of platforms to better coordinate resources. The organizations, post-merger, have structured themselves in a modular way, as to try to address IS architectural commonalties.

From the interviews with the two banks, it was clear that the interdependence of the business units and IS, and interchangeability of technology components within the IS architectural framework were two points where they saw possibilities for positive contributions, and both points were being addressed by the new financial services groups that they entered into. These are both IS and business strategy issues that address leveraging technology investments and prioritizing the needs of the business with the IS resources available (or in some cases, not available, but outsourced).

8.4 Discussion of Qualitative Research Findings

8.4.1 Impact on Productivity and Profitability

Given that the 'productivity paradox' has challenged many industries, was IS expected to make a positive impact on productivity during this time period in Belgium? Given the IS resources dedicated to the Euro and to the conversion for the Y2K rollover, plus the efforts towards the end of the period on the consolidation of banks in the sector, this negative response would not be a surprise to anyone concerned. But it is becoming more of a concern in today's market, up through the 2002 period of the physical introduction of the Euro, and the banks are spending money and time with consultants to try to figure out what they can do going forward.

Why the concern about profitability and productivity, where IS is concerned? Two fundamental reasons can be gleamed from this research. The first one is cost, of course. With consolidation, deregulation pressures, industry structure in Belgium, and a less protected position in the European market, retail banks are trying to become not only more knowledgeable about their customers, so they can hold on to them, but trying to cut or manage costs more effectively for the bottom line of their new financial service group parents.

The other reason is the evolving role of IS in banking operations. For this time period, IS was considered a support function to keep the bank in operation, similar to facilities management. BACOB had somewhat of a trendy idea, putting IS under risk management at one point. The current trend in financial services is assessing operational risk, as to what might keep the bank from operating and what risks or liabilities to the business could occur. The role of consolidation and mergers, and subsequent pressure from shareholders as to managing risk better, creates pressure on the IS organization to better understand the banking operations and inherent risks to operational integrity.

Capital investment in IS equipment, in a batch computing environment such as mainframes, has traditionally been a long-term investment. This investment has

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included maintenance fees, and one which has not been seen as providing competitive advantage but necessary capacity for a set period of time. Investment in the current environment of 2000 and beyond focuses more on throughput and on cost concerns that impact capital spending, which is more bottom line oriented than in the past. This also might explain the current focus on productivity and profitability.

8.4.2 Open Systems, and the Impact of the Environment

Using Rousseau's approach to technology and organizational structure (1979), the research suggests that given the slightly different approaches to IS utilization and the different organizational culture and communication structures, it might be said that the structuring and ordering of the concrete components of the bank may have a direct effect on the utilization of those resources.

In using the diagnostic model developed by Harrison (1994), more specific aspects of the organizational structure emerge as to their relationship with technology. This model emphasizes on understanding power relations and other actual practices and on assessing an organization's ability to adjust to external constraints and take advantage of new developments in its environment. This provides several important ideas for diagnosis of these organizations:

- External conditions influence the flow of inputs to organizations, affect the reception of outputs, and can directly affect internal operations.
- 2. Organizations are influenced by their members as well as their environments.
- An organization's success depends heavily on its ability to adapt to its environment - or to find a favorable environment in which to operate - as well as to tie people into their role in the organization, conduct its transformative processes, and manage its operations (Katz & Kahn, 1978).

The first point addresses regulatory and competitive pressures on the organization, which have been discussed previously for the Belgian banking sector. With the

external conditions of deregulation changing the shape of the competitive situation in Belgium, the mergers that followed were consolidations to increase economies of scale and, for some mergers, of scope. Expanded geographic presence, alternative delivery mechanisms, and integration of banking and insurance activities are all elements that have been influenced by external conditions. Another impact of external conditions is the amount of available IS labor in the market, given the Euro, the Y2K deadline, and the shortage in general of qualified IS personnel. This shortage also directly affected internal IS operations, as decisions had to be made on outsourcing taking into account what IS staffing levels and skills were available both internally and externally.

The second point - the influence of unions, customers, parent companies, and changing work environments, can be seen in the impact of power structures, communication and culture at the two banks on the IS resource. Post-merger, this can be seen especially in the parent companies, which now make decisions for multi-country organizations. And the role of unions in Belgian banking is particularly important in protecting jobs and benefits in mergers and consolidations (from the union view) and protecting the high cost of the human element in the transaction cost calculation (from the banks' view).

The final point, in regards to organizational success (which might also be viewed as competitive advantage), looks at adaptation to the environment. According to Harrison (1994), this adaptation need not necessarily correspond to the interests or priorities of top management. During this timeperiod, one might say this is the case in BACOB, as the level of adaptation to the market situation in terms of delivery channels and the IS skills/resources available appeared more flexible in its structure than ASLK's situation. Was that an issue of organizational fit? Perhaps, since a key issue was one of strategies and resources meeting the business need during this period. Or perhaps it was an issue of culture and levels of investment in non-IS components that held back change in ASLK, given it had an early take-over by Fortis in 1993, and did not cut back on non-IS investment during this period. ASLK, as a public sector bank, was not used to the private sector competitive situation, and was pushed into activities based on customer demand and market requirements, in certain cases.

8.4.3 IS Decision Making and future areas of change

The initial concept for this research was based on an idea from a change management research paper that used Galliers (1991) stages of growth model. Galliers's model represents the 'growth in IS maturity in an organization' with six stages of development. The original idea of this research was to find if one bank could have been further along the growth path of using IS effectively in comparison to another. But it is not as clear as all that, not only with measuring productivity and technology, but assessing where in the organization is the 'apparent bottleneck' to effectiveness. Processes need to be evaluated, as does the outcome of any process change. This involves looking at the centrality of processes, and participation and influence in decision making (Harrison, 1994). Baets (1996) suggests that the Benelux countries have evolved in their level of automation in the early 1990s, but that it is not clear whether or not banks build their strategy around IS-based market opportunities.

IS decision making has evolved during this period for many industries, including banking, and in order to assess the feasibility of change in this area, there are a number of questions to be answered:

- 1. Does the organization need strategic change?
- 2. Is there readiness for change?
- 3. How will internal and external stakeholders react to proposed interventions?
- 4. Does the organization have capacity to implement change?

The need is evident, given the evolution of IS organizations to resource support units within the financial services group. But the readiness, the stakeholder reaction, and the capacity to implement the change in a positive and productive manner has not yet been established. Given the ways in which stakeholders of these banks have reacted to change in the past, it may be stronger pressure from external conditions that will drive acceptance of change, or changes in the organizational culture which will make the decision process for IS investment a more inclusive and encompassing process for all parties concerned.

8.5 Informed Opinion on Future Direction

What happens from here on with the new organizations will also have a great deal to do with communication, culture, allocation of resources and levels of investment. From a futures standpoint, combining Rousseau (1979) and Harrison (1994), the structuring and ordering of the concrete IS components of the bank into an autonomous resource unit, supporting the whole financial services organization, allows the IS department to have its own power structure. This, combined with impact of the mergers and the cultural differences of the two or more bank IS staff going into the combined IS unit, should have a direct effect on the utilization of those resources in the near term (1999 - 2002). Although the banks were not willing to discuss the current situation in the process of this research, it would be an interesting follow-on project.

Discussion on Findings

Chapter 9: Conclusions and Suggestions for Further Research

9.1 Contributions of the Research

Although other research literature in the last five years has addressed the 'productivity paradox' of the value of technology in organizations at the organizational and industry levels, a contribution of this research is the use of the open systems model both in addressing the IS productivity evaluation issue and in assessing the role of IS in the organization. The use of the open systems model in viewing organizational elements addresses both a discussion of strategy through the concepts of transaction costs, environmental impacts and competitive advantage, and a discussion of IS through the concept of organizational process change and implementation of technology.

This research also contributes to the discussion of IS business value, in assessing if empirical input and output measures alone are valid ways of assessing IS productivity. One of the main contributions of the research is the confirmation that traditional quantitative measures for productivity and profitability do not show a positive contribution by IS in Belgian banking. This is consistent with several other geographies and industries. But using the case studies, the research shows qualitatively that IS does play a significant role in transaction processes, and this research finding might suggest further research to find a way to quantify that role as to highlight IS investment and its role in the organization. Perhaps a quantitative risk benefit analysis of IS investment to the organization should be developed, something similar to what banks are currently investigating for operational risk assessment, as to justify the IS role in the organizational operations and strategy beyond the role of competitive necessity to operations.

A further contribution is made by showing how complex process interaction is with technology in banking. There are multiple layers of abstractions to the relationship between technology and the organizational structure. Understanding the interaction between the layers in terms of decision making on both IS investment and IS process is important to the required outcome of those decisions.

9.2 Review of the Research Objective

The research objective was to present and study the impact of IS on the productivity and profitability of banks in Belgium during the late 1990s. Specifically the research conducted an empirical study of the productivity paradox, both at the industry and firm levels of analysis. The research then explored why one bank, from an organizational standpoint, may have a better use of technology than another in the same industry at the same time period.

The aim of this research was to examine if IS spending provided some form of advantage to retail banks, either in terms of productivity and profitability, and how the banks utilized technology internally to gain that advantage. The quantitative portion of the research on the individual banks was a marker in the ground to see who might be getting more out of technology than others in the sector.

The original intent of the research was qualitative: to see if a bank could be more 'mature' than others in industry about using IS, and why that had occurred, in terms of organizational structure and bank strategy, with a focus on competitive advantage. What the research evolved into was focused more on IS investment and decision making. This was partly due to the availability of hard data on historical IS spending to provide a foundation for the qualitative interviews, and partly due to the fact that the focus on competitive advantage using IS internally was not there in the banks, perhaps due to cultural or structural reasons, or perhaps from a strategic sense due to the passive support role that IS takes in Belgian banks.

The outcome of this research provides some insight on why Belgian banking has been protected by government resources in the past, and why the consolidation of the sector will continue in a search for greater economies of scale. Given the segmentation of the target markets of the retail banks, and the lack of growth areas internal to Belgium on a retail banking basis, the need for diversity into bancassurance and the need to grow through acquisition are evident. From the qualitative research, it is clear that a firm's IS strategy and the alignment of IS strategy to the overall firm's strategy could help in identifying how and where IS investment will aid the organization in these endeavors.

9.3 Conclusions

Banks expect investments to create a benefit, preferably profit, since that is the business they are in. But the investments made in IS, although necessary for creating the framework in which the bank operates, have not proven quantitatively that they provide a benefit, either in terms of profit or productivity in the environment. It is the case that banks cannot do without technology, since automation is expected to operate a bank, but how that technology can make the bank unique in its operations is usually focused on in terms of external products and services, and not internal processes. The banks are also concerned with cost avoidance from lagging behind other banks, with investment for the benefit of competitive necessity.

Perhaps if patterns of IS investment can show some visible benefit, such as in market share as in the Mexican banking case discussed briefly in Chapter 8, based on the bank's overall activity and not just a product or service, it might provide an incentive to view IS as an internal distinctive factor. From the interviews, many in industry do not understand the relationship between technology and organizational internal operations; they only see the customer-facing relationship of branch automation and external products such as internet banking. This might be a good thing in that the support role of IS in back office operations is an acknowledged given; an expected function of the bank which always works. In reality, finding a way to either quantify or qualify back office operations would not only put an additional value on the bank, but could possibly provide another revenue scheme (as discussed previously with KBC in Section 4.5.3.).

9.4 Limitations

One limitation of this dissertation was the restrictions of data availability, due to caretaker role of the BVB as a trade association. The BVB only provided top level data, and required members to give permission for individual bank data to be released. Given the sensitivity of this current period, as many banks are restructuring internally due to mergers, the researcher was actually quite lucky for one bank to provide the necessary top bank information under non-disclosure. The top seven banks within Belgium (now the top five) have traditionally shared their IS category data. However, having only top level data did not allow specific econometric analysis (i.e. DEA) nor did it allow more segmented calculations (large versus small, geographic, etc.).

Too often limitations of industry size or data may make it unfeasible to conduct a fullblown study. However, researchers could still seek research projects at the industry level:

- To find out the impact of IS on industries that are: IS-intensive (i.e. banks and insurance companies) and non-IS (for example, the construction industry).
- To forecast industry transformation due to IS.
- To assess different IS values for different industries, looking at company share price.

9.5 Suggestions for Further Research

The research agenda regarding the productivity paradox and the value of information systems in the organization is far-reaching. This section offers ideas for several future research studies regarding the value of information and the Belgian banking industry.

Follow up study of the impact of IS after 1998, post-merger

Only five large banks remain to-date out of the top seven banks, and that may be changing sooner than we think. The objectives of this project would be to find out: the bank IS strategy after merger; the contribution of IS, if any, to bank survival, and the IS impact on performance, size dimensions, and efficiency.
Measuring the value of specific IS applications in the banking industry, both in Belgium or in other countries.

Following the actual IS field trend toward investigating how to make technology productive instead of trying to find the positive impact of technology, the purpose of this project would be to identify a set of information technologies actually in use or adopted by banks, in both developed and developing countries. This would be in order to measure their contribution in value, performance, or bank productivity, and to assess if this contribution is also present in other banking industries belonging to different levels of economic development.

Cultural impact on IS policies of the Belgian commercial banks.

Another future research study is to test if the new owners post-1998 changed any cultural-related factors.

Balanced scored card research in Belgian banking

Another trend in the field of the study of the value of IS for organizations is to link the benefits of the technology with its use. Willcocks and Lester (1997) propose using Nortons' balanced score card to measure the value of IS based on its use or the motivating factors of the IS investments. The balanced score card model can be used too for linking ex-ante and ex-post IS impact studies. A longitudinal study of the scored cards and the firm performance parameters could offer the opportunity of examining both evaluation of the technology use and its ultimate impact on the firms performance parameters.

Cost accounting / project management

Another area for research, especially in light of recent enhancements in formalization of IS project prioritization, is to see what differences exist in cost accounting and the financial aspects of IS project management between financial organizations. This might shed some insight into the way banks view project management and cost expenditure.

Geographical / Geolinguistic differences

As previously mentioned, many Belgian banks are facing new competitors and are concerned about competing with banks from other countries. Therefore, examining Belgian banks versus Nederland, versus other EU countries (i.e. Spain), or versus other countries in similar situation (i.e. Mexico) would be interesting. And given the linguistic differences in Belgium, comparing to areas where the language/culture is similar (France, Nederland, South Africa, French-speaking Switzerland) would also be of interest.

Segmentation of the Expenditure Data

Another avenue of research could be a further segmentation of the IS spending data, breaking out either by type of bank [domestic versus foreign, large versus small, savings bank versus universal (full-service) bank, etc] or comparing specific spending issues, such as software, networks, amount spent on outsourcing, etc. The limitation on most of this would be access to the BVB data, since they are not keen on providing it except at a top-level of consolidation.

Like some other studies dealing with the productivity paradox, this project's limited access to hard data from the banks excluded the possibility for more econometric tests. Hence, the project's methodological approach was limited to a study with an five year longitudinal data set.

In conclusion, although IS spending fails to impact the operational efficiency of the banks quantitatively, it can be seen that external factors affect the impact of IS on the value, performance, and efficiency of the banks, including ownership changes.

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Appendices

Appendix A – Definitions

Business Process Re-engineering (BPR): "The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed" (Michael Hammer, 1993).

General Systems Theory: This was introduced in 1936 by Ludwig Von Bertalanffy, a biologist who sought to explain parallels found in different scientific disciplines; certain principles were common to all systems and these exposure of these common elements would allow for knowledge generated in different disciplines to be combined.

Information Systems (IS): A set of interrelated components that collect, process, store, and distribute information to support the operation of an organization, including both people and technology. From a business perspective, an information system is an organizational and management solution, based on information technology, to a challenge posed by the environment (Laudon and Laudon, 1994).

'Open Systems': The belief that organizations are systems of interdependent activities linking shifting coalitions of participants; the systems are embedded, independent on continuing exchanges with, and constituted by, the environment in which they operate (Scott, 1992). Open system theory can be defined as a framework through which one can examine the behaviour of living organisms regardless of any dynamic, pattern, process, or sequence of events. It is a cyclical process that emphasises the close relationship between a structure and its supporting environment (Katz & Kahn, 1978).

Retail Banking: Retail Banking is an umbrella term covering the many different types of banking activities including deposit taking, consumer and business lending, trust services, and other financial products and services.

System: A system is a set of objects or elements that interact to achieve a specific goal. The function of a system is to convert information, energy, or materials into a planned outcome or product for use within the system, outside the system or both. Systems differ from each other related to degree of self-sufficiency, complexity, and adaptability.

Appendix B – Discussion of Literature Search

The research literature search started with a few specific articles by the Wharton School and MIT researchers in this area (i.e. Brynjolfsson and Hitt, 1996). This expanded rapidly via the reference sections of these documents, with a paper trail established in a research notebook as to references to acquire, categorised by topic (i.e. competitive advantage). Documents were then categorized by topic and by linkage to other research works.

By attending academic conferences in the field, the latest research documents and associated references were acquired via proceedings and via discussions with peers in the field. The best secondary sources for the literature search were the business school libraries of London Business School and NYU (thanks to the researcher's own business schedule, allowing travel to these locations) as well as electronic sources for social science literature, such as the Journal of Economic Literature (JEL) and ABI/Inform (now Bell & Howell Learning).

Appendix C – Sample Questionnaire from Case Study Research

Sample of questionnaire guideline used in interview with Ph. ROMAGNOLI, Chairman, Artesia Bank on 14 Dec 99.

<u>Objective of the interview:</u> To define the role of technology in the organisation, how decisions regarding technology are made, how decisions regarding IS-enabled processes are made, and how the bank measures its use of technology, as well as its own effectiveness as a bank.

Questions:

1. Infrastructure

1.1 Where does IS fit in the organisational infrastructure? At the board level, management committee level, under logistics, under market operations and support?

1.2 Where does IS fit into the strategy planning of the bank?

1.3 How is IS managed within the organisation?

Technology Decisions

2.1 How are technology purchasing decisions made in the organisation? In what sort of timeframe?

- 2.2 How is technology viewed as part of the bank's deliverables?
- 2.3 What sort of inputs do the users / business units have in the decision?
- 2.4 What is the typical process of changing technology within a unit of the

bank? (i.e. horizontal operation such as human resources or a vertical operation such as investment banking)?

- Training
- Documentation
- Transitional processes
- Process Decisions

3.1 How are changes in operational processes decided (especially ones using technology)?

3.2 How does the bank define how effective a change is, in terms of measurement?

4. Measurement of Use of IS in Organisation

4.1 How is technology expenditure measured within the organisational framework? In terms of total cost of ownership (TCO), depreciation, value added to the operations, other?

4.2 Does the bank measure the effectiveness of its technology investment, and if so, how? Is it project based, or on overall usage?

5. Measurement of Bank's Own Operations

5.1 How does the bank measure its operations? Shareholder value, ROE, ROA, Total Loans and Deposits, other?

5.2 How does the bank compare with others in the Belgian banking environment, using those criteria above?

Appendix D – Interesting Quotes from Case Study Research

Interviews from Artesia:

"TT decisions should be like [the] decision for Pope....less and less food until they decide..." [Board of Directors]

"The IT guy makes statements, and everybody bombards him for resources..." [Board of Directors]

"We had a customer focus now instead of a product focus, which changed the way of thinking..." [IS Department]

"It is difficult to find [IS] personnel who know both technology and a particular line of banking..." [Senior IS management]

Interviews from Fortis:

"ASLK considered IT as a cost center, and since it was project based, we did cost/benefit analysis on projects from a quantitative analysis such as ROA." [IS Department]

"Organization was by business line, and there was a business plan per business line....technology was proposed by business line." [Senior Management]

"IT was managed by a priority list, but outsourcing was really limited to programming..." [IS Department]
Appendix E – Discussion of Triangulation

To address potential bias embedded in data collection, the analysis relied on triangulation techniques and verification of information from various sources for the researcher to decide on relevancy of findings, based on the comparison and crossanalysis of that information.

Multiple methods of data collection included:

- Interviews (semi-structured)
- · Published and unpublished internal documents
- Published reports
- Published policies
- · Observations of environment and people from interviews.

Coding categories were established using the Harrison (1994) definition of the open system organizational elements. Open coding is a techniques recommended by Strauss and Corbin (1990) and Miles and Huberman (1994). The recording of the data for analysis was undertaken singly by the researcher, therefore there should not be arising an issue of, among others, possible differences in coding, syntax and semantics outside of the definitions pre-set by the researcher for the recording process.

Open System Elements (Harrison, 1994)	Code for Content Analysis	Definition for Coding
Technology: Transforming resources into outputs	т	Equipment • Standard • Proprietary Processes • Standard • Proprietary
Environment: * Task Environment:	E-TE	External organisations and conditions directly related to the main operations and technologies (funding sources, suppliers, distribution, unions, clients, regulators, competitiors, collaborative

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		partners, markets for products and resources, state of knowledge concerning the organsiation's technologies)
Environment: • General Environment	E-GE	Institutions and conditions having infrequent or long-term impacts on the organisation and task environment (economy, legal system, population changes, politics, national demographic shifts, etc.)
Goals and Strategies	G/S	Future states sought by organsiation's management and stakeholders (strategies, goals, plans, objectives)
Behavior and processes	В	Patterns of behavior, interaction and relation between groups (communications, reward systems, decision making, power relations, problem solving processes, information gathering, evaluation, group learning)
Culture	С	Shared norms, beliefs, values, assumptions, nature and identiy of the organisation, the way work is done, value of innovation, relationship between layers of management
Structure	S	Role assignments, grouping of positions in divisions, departments, std operating procedures, HR mechanisms, established mechanisms for decision making

Content gathered from secondary sources (internal documents, published reports, journal and news articles, etc.) were coded and analyzed, including name/source of the information, geographical location of the information, time frame of the information, and sample quotes from the information. The trends and patterns arising from the content analysis were used in conjunction with the case study interviews to test concepts and to check what linkages were occurring. Given different versions of the questionnaire guideline were used for different interview subjects, information obtained via content analysis was incorporated into revised survey documents as the research progressed. Pattern-matching was used by taking several pieces of information that seem logically related and connecting them to the appropriate element of the open systems model. The patterns were compared, looking for the best fit of observed data to theory.



